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Gas-Light Association of the United States.

PROCEEDINGS OF THE SECOND SEMI-ANNUAL MEETING OF THE GAS-LIGHT ASSOCIATION OF THE UNITED STATES, HELD IN CLEVELAND MAY 13, 1874.

[Concluded from page 6.]

Mr. Nettleton—I have one more subject to bring before the convention and then I am through. This matter of revision of the constitution. I would like to ask the convention whether they have any instructions to give the committee, or whether the committee are to take the whole constitution into consideration, and present substantially a new one. Notices of amendments are required to be given at a previous meeting, or they may be made by unanimous consent. If there are any instructions to be given I would like to receive them.

The President—It seems to me it would be exceedingly unwise to enter upon a question of that kind. If we enter upon it we shall find ourselves at sea, and cannot adjourn to-day. I hope the committee will not ask for any instructions.

Mr. Hague—Mr. President: If it is in order, there are one or two things I should like to hear from gentlemen in regard to. There was a little informal discussion this morning among members about cement and leaden joints. I would like a little information upon these points.

The President—Who will undertake to give his views upon the comparative value of cement and leaden joints?

(Several members—Mr. Walker!)

Mr. Walker—Mr. President: I do not know why I should be called upon before anyone else.

The President—Because you have experience.

Mr. Walker—Mr. President: My experience in cement joints has not been very extensive. I use lead in all underground work; I use cement all through the works—everything in the works from the first joint above the retorts, until I pass the meter and get underground to go to the holder. I use ordinary cement (waterlime) also Portland cement. My mode of making cement joints I described to some gentlemen this morning. I find joints to be very thoroughly protected by cement made in that way, where they are above ground. I have objections to using cement underground, as there is no chance for expansion and contraction. In making cement joints I just put in sufficient packing, to prevent the cement running into the pipe, then putting on a clay roll, same as for lead, pour in the cement, allow it to set a little, then remove the clay and finish with a trowel. I have found it satisfactory on all joints around the works. In making joints on the hydraulic main, I use trunk board packing soaked in cement, and it is the easiest and best joint I ever made; but underground, where pipes are exposed to such variations of temperature as we have North, and where pipes are apt to be moved by filling trenches. I object to using cement, for the reason that the joint will break with the least movement before it is thoroughly set; and I have found in some instances that the pipes were parted about one quarter of an inch, and without any depression, showing clearly to my mind that the break was caused by contraction; we have found several this spring in this condition. Where the temperature is more uniform this would not be likely to occur.

The President—Some gentlemen are accustomed to using Roman cements in making joints. We would like to hear from them.

Mr. Hyde—Mr. President: We use Roman cement around our works, and use lead on the streets. There is not much difference in the cost.

The President—Will some gentleman who is accustomed to using Roman cement underground, give his experience?

Mr. Hague—I have laid five miles of pipe with Roman cement, and I have had some broken mains. I think I would have had them with lead joints in the same position; but I wish very much to hear from other engineers to get their experience. My experience with Roman cement joints has been good.

Mr. Dwight—I use Portland cement, some engineers use common cement. I have 27 miles of pipe laid down with Portland cement joints, and, of course, our soil is a very good soil for pipe. It is a loam-sand; but my loss last year was five per cent., showing that we must have pretty good joints. We never have any difficulty with them at all, not when they are well made. I used to use what was called the Roman cement, but for the last five years have used Portland cement entirely. I use the Portland just around our works, every place I can get at conveniently, except where there is a close place, then use a lead joint.

Mr. Hague—Do you use two packings or only one.

Mr. Dwight—Two.

Mr. Walker—I first used two packings, and then I began to wonder why I did it, and now I find it easier to use only one.

Mr. Dwight—We have a small tin dish in which we mix the cement, have a small trowel to put in the first packing, drive up the first packing and then pack with cement.

Mr. Walker—How deep do you lay your main?

Mr Dwight—Our mains are laid on an average of 3 feet deep.

Mr. Walker—Do you ever find the frost underneath them.

Mr. Dwight—Yes Sir; clear down below.

Mr. Walker—Do you ever have your mains to break?

Mr. Dwight—I have had the mains break but not the joints.

The President—That raises the question—whether if you had had a lead joint would the main have broken?

Mr. Dwight—I never had but two mains to break in the last 15 years in the whole city, so I do not think I have been troubled very much with main breaking.

The President—What was the cause of the break in those two instances?

Mr. Dwight—It was the settling of the ground in particular places.

The President—Was there any contraction or expansion.

Mr. Dwight—No sir, nothing of that kind.

Mr. Nettleton—I used Roman cement in laying some seven or eight miles of pipe; and, in the cold weather a year ago, in two places, the pipe was drawn right in two, I was satisfied, by contraction, I said to myself I would make no more cement joints underground. I used lead from that time forward.

Mr. Walker—I had two pipes break precisely from the same cause, only two and a-half feet underground at that time. I was just going to say that the mains we found broken in that way were not broken by the settling of the ground; they were on solid ground and parted as Mr. Nettleton says.

Mr. Nettleton—The difference between Roman and Portland cement is this: Roman cement sets a little quicker than Portland, but the essential elements of each are precisely the same.

Mr. Coombs,—I would like to ask Mr. Dwight a question: I believe you stated your waste was 5 per cent. in street mains.

Mr. Dwight—Yes, sir.

Mr. Coombs—I would like to ask about what your yield per pound of coal is?

Mr. Dwight—I do not know that I care very much to be catechised on that point. Our yield varies of course. I have been averaging 4·60 and 4·70 a pound, often 4·80.

Mr. Coombs—Could you state about how many thousand feet you lose per month to the mile on your mains?

Mr. Dwight—I can not answer that question, I have no means of knowing.

Mr. Robinson—I would like to inquire of those who use cement, whether they use it pure or with an admixture of sand.

Mr. Walker—I use it pure in my case.

The President—Mr. Dwight, what is your practice?

Mr. Dwight—My practice is to use it pure.

Mr. Robinson—We have always used Roman cement for joints. Our pipes are laid at the uniform depth of three feet. The soil there is gravelly and solid, and the joints, when examined, have very generally been found to be entirely tight. The first few miles of pipe that were laid at Columbus, by the contractor who erected the works, were laid with lead; and at the time the mixed pavement was laid over our

principal streets, those joints were dug down to, examined and tightened, and cement put on. We found that a great many of the joints (lead joints) were leaking, as was shown by the discoloration of the earth around the joint; and, by that examination, we came to the conclusion that the cement joint answered our purpose best. We have had Roman cement, had some year before last, with which we could mix from one-third to one-half pure lake sand. It would set quick enough, and would do just as well; but we could not use anything but the purest lake sand.

Mr. Walker—There is one objection to using sand—the tendency being that the joint may become porous.

Mr. Robinson—That was the objection to the sand in our vicinity, but the lake sand we could use.

Mr. Littlehales—Mr. President: There is another question, that of wooden pipes, in which I feel a great deal of interest; and if any member has had any experience with them for any length of time, I think it would be to the advantage of the association if he would state the results he has gained. We have laid a short distance of it in Hamilton, as a matter of experiment—about a mile and a half, or something like that—and, I believe, so far it is perfectly tight; but, as to durability, of course that remains to be proved. I understand that in a number of towns in the States a quantity of wooden pipe has been laid, and some gentlemen here may have some experience on the subject; no doubt the convention would be pleased to hear that experience, because, if wooden pipes are a success, gas works can be constructed at a very much less cost.

Mr. Spencer—On the question of joints—a very important question—(before this other question is considered) I have had a little experience in the use of both lead and cement; used lead formerly and cement for the last two years; and while Mr. Nettleton has had pipes broken square off with cement joints, I have not had; hence I do not think it will do to come to a conclusion from any one experience in regard to these things. I have laid perhaps a mile and a half, or two miles of pipe, a part with Roman and a part with Portland cement, and the most of it was laid before the excessive cold weather of a year ago this past winter. It was all gone over this spring, and only one or two leaks were found in the whole of it, where the joints were used up, the rest of it remaining in tact even in our cold climate.

Mr. Walker—Mr. President: With reference to wooden pipe, I have had very little experience in using it; but I have seen a good deal of it used, and the objections to its use that I have are these—that any material used for the conveyance of gas from the works to the burners, that requires any gum or resin that naphtha will dissolve to make it gas tight is unfit to be used for that purpose, as whenever the gas reaches this material it will dissolve it, and a leak may follow, and the dissolved tar or asphaltum cement with which the pipes are coated when dissolved will flow to the drips, and render it impossible to pump them. I have also had this experience with cast iron pipes that were coated with this cement, which may be of benefit to some people; the tar being in the joints it was supposed by us that pouring the lead in very hot would clean it out; it did not do it, and although the pipes were tested with water, and stood a pressure of forty pounds to the square inch, and I have never seen tighter joints, yet the tar in the joints dissolved and ran out, and in a little more than a year they had all to be gone over again. I got myself into considerable trouble with this wooden pipe business, by stating this fact to a gentleman who came to consult me on this subject. I believe they have abandoned the use of tar in the inside of the pipe. In the northwest where I come from, two or three companies use tamarack logs, and I certainly would prefer that to the manufactured pipe. Another point; they lay those tamarack logs in a soil that is wet all the time, and that is greatly in its favor; I would not like to lay them where it was dry—and these men claim very little leakage from it. I have no doubt about this manufactured pipe being gas tight when it is laid, but wherever gas reaches the bitumen or tar cement in any shape it will clean it out. I know that in one place where they put it on the joints they had to dig up and relay them. Another instance of where they put down wooden pipe, the tar dissolved and ran into the drips and gave a great deal of trouble. I have had the same trouble with iron pipe tarred inside.

Mr. Severance—Mr. President: There has been one point dropped, and that is the question the gentleman from Youngstown (Mr. Coombs) asked. It seems to me it is an important one—What is the leakage per mile? I have no doubt there are parties losing enough in a mile of pipe to get a good square dinner. It is a very important point to know where it is. This matter of joints and cements bears upon it. Now, a good many of us have had losses to the extent of 25 per cent. or 30 per cent.; we want to know how to overcome that. The gentleman from Youngstown (Mr. Coombs) wanted to know of Mr. Dwight how much he could get out of a pound of coal; and Mr. Dwight did not care to be catechised upon that point. Now, Mr. President, that is what we are here for; we want to get this information—want to learn something. I came here for that purpose. Now, I will give my experience with cement joints, but I may say that it does not amount to much. With the use of Roman cement joints I have found a good many leakages, but by the advice of Mr. Hyde, I have gone over the ground and examined the joints with a steel bar, casting it down into the ground, and with a light, have very soon found out whether there was gas in the neighborhood. I have pursued this course twice a year, and I find it pays—that we can save a little money out of our losses, and thereby afford to sell gas a little cheaper. Now we wish to know how much we can get out of a pound of coal. Some of these gentlemen say a good deal over five feet: another man don't like to be questioned.

The President—This is a little irregular. Mr. Littlehales brought up the question of wooden pipes. If any gentleman has any information on that subject, no doubt the association would be glad to hear it.

Mr. Severance—I beg the gentleman's pardon, but I did not want to lose sight of the other subject.

Mr. Littlehales—If the convention will pardon me for diverging just a moment, I would like to say but a word about that method of finding out the cause of leakage. I would not do it on any consideration, for the reason that some parts of the pipe may be very thin, and if a bar is put on to one of those parts, what is the result? Instead of discovering the leakage you make it. There is great danger arising from the use of that method, and I would caution gentlemen to be very careful about it.

Mr. Walker—Mr. President: I have used the same kind of a bar for sixteen or eighteen years, and I never have punched a hole in a pipe, and I can find the smallest hole in the street anywhere.

Mr. Severance—There was no motion to take up the wooden pipe, and therefore the other subject was before the convention, on Mr. Hague's motfon.

The President—We had dropped that and the other subject had been taken up. Now, if we are through with the question of wooden pipes, I want to be indulged a moment in a statement. I want to get back to the subject that was mooted yesterday. The reason I do so is that a very extraordinary statement was made to me in regard to the experience of a gentleman of this convention. He said he did not want to be called out, but I told him I should do it, and he did not very seriously object to it. The gentleman is running a small gas works in this State, uses no exhausters, runs without a dip, without a seal, and has not been obliged to clean his retorts for three years I told him if he would tell the rest of us how to do it we would be very glad to learn it.

Mr. White—We will give him $50,000 if he will come down to Brooklyn, and teach us how to do that.

Mr. Reinmund—Mr. President: It is hardly fair to call me out in this manner. When you asked me to make this statement I remarked to you that I came here to learn and not to give my experience, for I did not consider it worth a great deal. In running these one-horse works we are deprived of the talent of experienced engineers; we cannot afford to have them—at least our company thinks so; and we have to work as best we may. Our works were started on the old plan of hydraulic main, and I found when we commenced using clay retorts, that about every two months we had to lay off for scurfing out, and in small works it was no small matter to lose the use of a retort. I determined upon a plan of my own to dispense with the hydraulic main. It is a movable seal attached to the bridge-pipe. Now, I state facts, and do not wish to be catechised; I am not prepared to be catechised. This last fall I shut down two benches of clay retorts; before doing so I remarked to the superintendent that some of my neighbors had insinuated that I was using coal that did not have sufficient carbon in it to cause an incrustation of the retorts, therefore I got rid of the trouble. Now, said I, Mr. King let us test this. You leave this one bench under seal and work the other without a seal, and in six weeks I could not have run a hundred pounds of coal, whereas the other run two hundred pounds each charge, right straight along. Those retorts were used—one of them nearly three years—one bench—and the other a little over two years, and I pledge my word there never was any carbon collected upon any of them.

The President—Describe your system

Mr. Reinmund—My system is making a dip in the bridge-pipe, between the stand-pipe and the point where the hydraulic main should be. There is a dip in the pipe instead of making a bridge there; there is a dropper (?), and then there is an outside bucket that is governed by a lever. I have seen a plan in Eastern Pennsylvania that has an inside arrangement that leaves the bucket above. This of mine is an outside jacket. When the charge is being drawn the stoker raises the bucket, and this seal in the bridge-pipe prevents it going back; and, if in charging, or after having let up he should neglect to unseal it, it will work just the same as the hydraulic main works: but the object is to let the bucket down and give free flow to the gas without its coming in contact with any liquor at all. Use no exhauster, and the pressure-gauge stands at about 2½.

The President—Have you any gauges between the retorts and the rest of your bridges?

Mr. Reinmund—I had a gauge there that broke a short time ago.

The President—Will you state what your results were?

Mr. Reinmund—Our yield is about 4.25. We are using a coal that is not generally known as a gas coal. It is a new field in Perry county, close to our place—Straitsville coal. I do not know what, under proper treatment, that coal would yield.

The President—It produces about 3.80 at Columbus.

Mr. Reinmund—I may say that I was the first that used that coal, and I corresponded with Mr. Douty of Columbus in regard to it. One of the proprietors of the coal company said to me, "You have introduced our coal in Columbus."

The President—I would say that Mr. Douty told me two years ago, soon after using the Straitsville coal, that the yield was about 2.80.

Mr. Miller—I would state that I have just finished, having a pressure of 2.10, and on a test I made with this Straitsville coal I got just exactly 3.50, and I do not believe his yield has been over 3.50.

The President—This is a coal which is especially used in blast furnaces; of course there is not so much bitumen in it, so if our friend gets 4.25, it is an extraordinary testimony to the vacuum process.

Mr. McIlhenny—Mr. President: I am really disappointed at the very strong endorsements of the theory that I presented yesterday. My friend here says that without an exhauster he gets more astonishing results than I had any reason for anticipating, and I think every person that I have heard speak on the subject, has testified that the theory I have advanced is the correct one.

Mr. Miller—Mr. Walker has spoken to me in regard to carbon I am using what is called Douty's Patent

Dip-pipe: the same principle as that of the movable seal, and I find in my retorts more or less carbon. In this retort seal attached to these test works, I find it quite different from what Mr. McIlhenny states. I find it on the dip (?) in quite large formations.

Mr. Severance (to Mr. Reinmund)—You say you make 4.25, now what amount of gas will the meter show?

Mr. Reinmund—I do not think my answer in regard to that would be any criterion at all, for the reason that from the very starting of our works our street main has been leaking, and our loss has been about 25 per cent.

Mr. Nettleton—Has your loss been more or less since you worked in this way?

Mr. Reinmund—Our loss has been less; and here I may come back to the subject of wooden pipes, and say what I had intended to say on that subject. I have for the last six years put down nothing but wood en pipe, and our loss has been less, although our main has been extended some three miles.

Mr. Walker—Mr. President: The question under discussion was the collection of carbon on retorts.

The President—As connected with running without a seal.

Mr. Walker—I was about to suggest that I have in my experience with clay retorts, which extends over some eighteen years in this country, found retorts that collected much more carbon in them than others. I do not know what kind of a retort the gentleman uses. I do not want to ask him, and I do not want to tell anything about the kind I use, because I do not want to advertise anybody's property, but I was going to tell you in speaking of running retorts, of one or two instances where they run just one retort; they are 30 by 15, and they needed just about what they would make; and the reason they run one retort is that they did not need to save coke in winter to run with in summer. They make about 8,000 cubic feet in that one retort 15 by 30, and 8 to 9 feet long. They have no trouble in keeping them clean to make all the gas they want. They are in the habit of laying off on the Sabbath, as near as can be done, the 24 hours; and I believe that bugbear of carbon—I know it is an awful bugbear to some—I think resting on the Sabbath has something to do with my not having so much trouble with carbon (applause). I am not speaking with reference to the moral side of the question; that is a different thing. I mean that by working six days of the week instead of seven, that I loosen the carbon, and it comes off very easily. For that reason I am not troubled near so much with carbon as other gentlemen, and besides, my men are better, and I get better work out of them; and I do not know but I can make as much gas in six days as some people do in seven, and do it as easily. The men are anxious to get the Sabbath, and work better during the week.

Mr. Steele—Do you make less carbon in the six days than you do if you work on Sundays?

Mr. Walker—I do not attribute it to that, but it is because the retort lays off that I am not troubled with carbon; and my yearly results prove that I do about as well as anybody else.

Mr. Sherman—Do you not lie idle for the purpose of removing carbon?

Mr. Walker—We do occasionally, but it is no trouble at all.

Mr. McIlhenny—Mr. President: I am glad Mr. Walker has made the statement that he has. The impression has prevailed from the commencement of his statement that he did not have any carbon; but from the statement he has just now made, that his retorts are idle fourteen per cent. of the entire time; one day in seven his retorts are idle. That embraces 14 per cent. of the entire year that he makes nothing from his retorts, and he says he has a considerable quantity of carbon every six days. Otherwise he has no means of getting rid of the carbon; it accumulates; and the only reason he does not have it in large quantities is because he frequently removes it.

Mr. Walker—That is the idea exactly.

Mr. McIlhenny—Fourteen per cent. of the time lost.

Mr. Walker—That is very clear—14 per cent. of the time, if I can so manage it, I do not make gas—as near that as possible. But you can go to any place where that system is practised—go to Hartford, Connecticut, during the years I had charge of running the works there, and see whether they did not realize results equal to that of any other works where the seven days of the week are worked; and I am prepared to show what I am still doing, and I can name other works where I have partially introduced that system of working. I know that in Hartford, Connecticut, I was visited by some gentlemen from, I think, Massachusetts; and they considered that I made quite as much gas in six days as they did in seven. I think the physical condition of my men is better—that they do more work—if they rest on the Sabbath day.

Mr. Hague—Mr. President: I have tried that plan twenty years, and I fully endorse every word Mr. Walker has said in reference to Sunday work.

Mr. Littlehales—Mr. President: This same subject was brought up before the British Association. I believe all were anxious to abolish Sunday labor; and the London engineers agreed to give every possible chance to the effort to do away with it, and they did. I will tell you what the result was:

Before six weeks had elapsed in the Crystal Palace works, every one of the men asked to be permitted to go on with the work. Why? They stopped on Saturday night and let their fires go down, when they came to take out the clinker about three hours were gone, and they were nearly exhausted. They found it was much harder on them by working under that system, and they unanimously asked to be allowed to go on with the work as usual, for the reason that there was less strain upon them by doing it that way than by letting the fires go down.

Another objection: The charge being left in the retorts some considerable length of time, a large amount of carbonic oxide gas was given off, all the inferior parts of the gas carbonized into a sulphur compound, and all the retorts had to be charged at once; and then if you don't do that, if you only charge a part of them and leave a part of them for the next charge, then there is a portion standing idle, so they gave it up; and, I believe, in no one of the London works that I am aware of, do they work in this manner, and so far as the laborers are concerned, I believe the unanimous opinion is—they can work more economically, with less strain upon the men, by giving each man every third or fourth Saturday, but keeping the fires going regularly at the same time.

Mr. Walker—I am sorry to hear the gentleman tell us they have returned to Sunday labor in London because it was more profitable; but, in his concluding remarks, he has proved that rest to the men is profitable. If it is a question of profit and loss, the yearly results will determine that very clearly. This gentleman (Mr. Littlehales) says that the men were dreadfully fatigued in cleaning the fires after they laid over the Sabbath. I must say I never had a complaint of that kind from any of my men, and have never heard them express any desire to return to Sabbath labor. I think, on the other hand, I can get my men to work for less pay than is given in other places where they work seven days in the week. I have had no trouble, and in reference to cleaning the fire there is no clinker making during the entire time of laying off. The dampers are closed, and there is a man in charge whose business it is to see that the fires do not go down. Now, with regard to carbonic acid and sulphur compounds: My charges do not run any longer than usual, the lids are slacked off at the regular time. I am sorry London engineers cannot get rid of it by slacking off the lids. I simply slack the lids to allow the gas to escape, so that there will not be much chance for air to enter, and leave the coke remain there till we are ready to charge again.

With regard to the profit and loss of the matter I refer you to the President of our works, and to all the works I have been connected with, where the system of doing away with Sabbath labor has been practiced. I am sorry the London people have given it up.

Mr. Littlehales—I would simply say that the London people have given it up at the special request of the men. To my own knowledge they came in a body to the engineer and asked it.

Mr. Hague—Mr. President: There is another reason why those men should come in a body and make that request. I am now and have been engaged in running certain oil wells; and, as a general thing in the oil regions, they ran the seven days of the week. I never have run mine more than six. My men came to me one day, saying—"these wells are being spoiled by shutting down Saturday nights." "Let them spoil," I said. Said they—"We don't want to run a well that is being spoiled," I told them to go and get another job. The fact is they wanted seven day's pay, and I would not give but six; my wells today are the longest lived in the region, and I attribute it to that fact. I have better men—men that would not work Sundays if I wanted them to.

Mr. Littlehales—Mr. Walker speaks in regard to the lids being slacked when the charge is worked off, and wonders that the London men had not thought of this; but I think they would not slack their lids if they knew that by so doing they would crack the retorts, and that is one reason, in using clay retorts, why they do not do so.

Mr. Walder—That is a mistake entirely. I again desire gentlemen to look at the yearly results, in works that have been run in this way, in regard to that point, if the retorts cracked. The yield would be very small and the life of the retorts very short. The only difficulty I have found is, when my retorts have been running 3 or 4 years, even *five years*. In one place I made abodt five million cubic feet per retort.

Mr. Hickenlooper—Would there be any change in the temperature of the retort?

Mr. Walker—The temperature is higher owing to the coke being left in.

Mr. McIlhenny—Mr. President: I regard this question as one of considerable importance—the question of Sabbath labor. Every one of us who has had a religious education feels inclined to respect that day; but there is an insurmountable difficulty in the way, especially in large cities. We all know that the consumption of gas is very heavy on Saturday night, and, without a very large amount of storage room, it would be almost impossible to keep up with the consumption without working on Sunday. That is the only objection I see to the system—otherwise I think it is very feasible; and if it could be adopted it would be preferable to the present system of working seven days in the week, but I think one difficulty would be a serious one. The great consumption in the large cities, that could not be provided for except by having an excessive amount of storage room. We all know that no matter how well you guard the amount of consumption and supply, that there are times when we will be caught, and that time might be on Saturday night. The weather changes constantly, and, no matter how large your storage is, you will be constantly drawing on it under circumstances over which you have no control; and, at the very time your men are supposed to stop, your supply is at the bottom. In small cities I do not see that these difficulties will occur, and I think that the system of resting over one day in the week is a good one.

Mr. Severance—Mr. President: I move that Mr. Walker be invited to prepare a paper to be read at our next meeting, on this subject.

The President—We have as yet taken no action as to the order of business at our next meeting, and it occurred to me while Mr. McIlhenny was speaking, that the subject, as he just remarked, was one of importance; that if Sabbath keeping can be introduced in the gas business we ought to to know it, and I was going to suggest that Mr. Walker be requested to write and read before the association in October, an article giving his experience and views at length on this question.

Mr. Walker—Writing papers is a little out of my line, but I will do the best I can. I would say, before sitting down, that some Eastern gentlemen may have an opportunity of going to Hartford; if they go there I hope they will examine the company's books during the five years I was in charge of the works, and worked upon that system, and I did not have a very extensive amount of storage.

Mr. Hickenlooper—Mr. President: As ninety-nine out of a hundred of us will not have an opportunity of visiting that place, would it not be well for Mr. Walker to obtain those results, and incorporate them into his paper.

The President—I suppose Mr. Walker will fortify his position by all sorts of evidence.

Mr. Walker—Mr. President: I may say also that I never changed the pay of the men; and when in a neighboring city two years ago, the men demanded 75 cents more per day, and when there was a great deal of trouble with strikes in New York, my men were perfectly satisfied with $5 a month more—from $45 to $50 per month.

The President—Has any one any suggestion to make as to the other topics which it might be desirable to have brought forward at that meeting.

Mr. Hickenlooper—Mr. President: I would suggest that Mr. White be requested by the convention to prepare a paper on the subject of naphtha gas, to be submitted at the next meeting. Carried.

Mr. Wood—I move that Mr. Price be requested to present his paper on coal, at the next meeting.

The President—My only object was to partially prepare the order of business for the next meeting—something that the meeting could rely upon. Of course voluntary papers are always in order.

Mr. Nettleton—Mr. President: An article on leakage or unaccounted for gas, will be presented to the convention by my son, C. H. Nettleton, of Derby, Conn.

Mr. Steele—I would suggest that some one be requested to prepare an article on purification.

Mr. Hyde consented to prepare an article on purification.

On motion of Mr. White the convention adjourned.

Water Pipes and Frost.

J. A. Calantarients, surgeon, Scarborough, has patented a simple but ingenious method of preventing water pipes from being burst by frost. Water, in freezing, expands about a twelfth of its bulk, and within that limit the expansive force exerted is so enormous as to overcome the resistance of any pipe or vessel yet constructed. Mr. Calantarients solves the difficulty by passing through the water pipes an indiarubber tube of such diameter that the space inside is a little more than equal to the increase in volume of the water by freezing. There is thus secured in the inside of the pipe a space equal to the difference of volume between water and ice—the proportion being 1083 to 1000—so that when the water freezes and expands it occupies the space thus reserved for it instead of exerting its force on the pipe. The indiarubber tube is always kept full of air, so that when the water freezes it finds at every point the necessary space to occupy, for by compressing the tube it displaces the air and takes its place. Again, when the ice melts the air-tube expands, ready to be acted upon by another frost. The air is supplied fram a reservoir, which is acted upon by the water pressure, so as automatically to put the air-tube under an exactly corresponding degree of tension. By heating the air in the tube the water in the pipes can be thawed. This application is peculiarly useful in the case of water-closets, and in preventiag the supply of cold water to engine-boilers becoming interrupted by frost. Not less important is that the invention can be applied to preventing the explosion of kitchen-boilers.

There is little doubt that we have here a cheap but effective remedy against a fertile and long standing source of discomfort and damage. Incidentally, security against the bursting of water pipes during frost will likewise facilitate their more convenient disposition throughout a house, and permit the use of much lighter and consequently cheaper kinds; while it has been proved, by repeated experiment, that the inversion retards the freezing of water in pipes, and that a frost which will close unprotected pipes has no effect upon those containing air-tubes.—*Iron.*

Chemical Repertory.

No. 116.—July 16, 1874.

EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

1164. Something to Cry About.—"Contemporaneous History" gives us, in the newspapers, the following: "A bright youth in Richmond, Kentucky, learning that gas was to be introduced, and observing the workmen digging out places for the pipe, inquired of one of them 'how deep they would go down before they struck gas?'

1165. British Patent.—Charging Retorts.—J. Manwell, Glasgow.—These consist principally in imparting a sufficient momentum to the entire charge or quantity of coal, shale, or other materials with which the retort is to be charged, on bringing the charge up to the mouth of the retort in a scoop or holder, so that when the scoop or holder is arrested at the mouth of the retort, the charge is thrown into the retort.

1196. Short, Sweet, and Sentimental.—Much rhyme has been shed upon cremation. The following may probably be classed with the cream of the subject. An onion might fitly be cut into small fragments before reading it:

This world is all a fleeting show,
How sweet from it to pass,
To vanish up a chimney as
Carbonic acid gas.

1167. Sulphocyanogen in Gas.—We have before referred to this powerful poison as contained in crude gas. A German chemist, Kohlrausch, tells us that "a fertilizer has appeared in the German market, which has, as an ingredient, the waste Laming's material of the gas works. It is objectionable from containing oxide of iron, which renders insoluble a part of the soluble phosphoric acid, and, from its contents of sulphocyanide of ammonium, 0·005 grm. in a kilogram of earth (=say about half an ounce per bushel) destroys vegetation.

1168. British Patent.—Gas Heating Apparatus for Laboratory Use.—T. Fletcher, Warrington, Lancashire.—These are to afford a wider range of heating power than hitherto, which is accomplished by having a ring of burners and a single jet of gas, either of which may be lighted inside a cylindrical casing, or the ring may be utilized for supplying gas, to be lighted above a wire gauze covering, to such cylindrical casing on the Bunsen principle: and the pipe which supplies the single jet and its nozzle may be utilized as a blast-pipe for increasing the supply of air to the flame.

1169. A German Gas Invention.—The newspapers give us an item purporting to convey a new mode of jointing gas-pipes in Germany: "Instead of the usual projecting end, the pipes have creases or channels around them. When placed in contact, end to end, a strip of soft lead is bound about them, and pressed tightly against the pipes by a wrought iron ring. The advantages claimed are that the pipes are lighter and more easily cast; less lead is required to make the joint tight; no heat is required for applying it; it is quickly done: and especially that the joint is somewhat elastic, and will last longer in soft ground, or when heavily loaded."

1170. The Soap-Fat Butter.—To this subject we have already given enough space, but the following bit of history, for which the *American Grocer* is responsible, may go upon our record: "Public attention was first directed to this by the efforts of a Mr. Paraf,* an ingenious Frenchman, who was, we understand, engaged for some time in a series of experiments for the Spragues, of Providence, to extract some new dyeing qualities from madder. They say he did succeed in extracting some $80,000 from the celebrated Rhode Islanders, while they kept on getting madder and madder, until they were perfectly willing for him to die any way he pleased."

* Notwithstanding some popular rumors, we would state that this gentleman is *not* the discoverer of paraffine.

1171. Heat of the Sun.—Father Secchi, the distinguished astronomer, has recently published the result of his investigations on the solar temperature, made during last summer, and states that his efforts were directed toward the determination of the relation of the solar radiation with that of the electric light. The instrument used was a thermo heliometer of the investigator's own invention, and the conclusion arrived at was that the radiation of the sun would be 36½ times that of the carbon points. If, therefore, the temperature at the surface of the latter is fixed at 5,432° Fah., a number not exaggerated, and supposing the radiation proportional to the temperature, we obtain for the potential temperature of the sun 240,836° Fah.—*Scientific American.*

1172. Hydrogen Apparatus.—It is not a difficult matter to avoid explosions in your hydrogen generator, provided you possess sufficient patience to wait until all the air has been expelled from it before igniting the gas. Nevertheless explosions are much too common, either through carelessness or impatience, and perfect safety is often obtained at the expense of a considerable loss of time and material. Dr. Fresenius has, therefore, applied the principle of the Davy safety lamp to his hydrogen generator. A number of discs of fine wire gauze are placed in a short glass tube, and held in position by cotton wool pressed against them on both sides. This little tube is introduced near the exit of the gas, and prevents the explosion from extending to the wash bottle and generator itself.—*Jour. of Applied Chemistry.*

1173. New Scotch Coal-Field.—Bathgate has become renowned throughout the world for the valuable mineral resources which have been developed in its more immediate neighborhood during the last thirty years, combined with the numerous and important mineral oil works, of which it may be denominated as the centre. Capitalists, coal, iron, and oil companies have not been idle during the last few years in exploring the probable mineral wealth of every estate in the surrounding district. The estate of Foulshields, belonging to Mr. T. M. Durham, has been tested and not found wanting. The Drumpellier Colliery Company have leased the minerals, and operations commenced about May last year. At the depth of 27 fathoms a three feet vein of a fine clean black coal has been reached, and is being wrought for country sale. The seam has a fine, hard sandstone roof, and is eight inches thicker than what was presented by the bore journal. Three other seams of 3½ feet, 2½ feet, and 5½ feet are expected to be found at a depth of 15, 3, and 7 fathoms respectively.—*Iron.*

1174. Testing for Boron.—The most delicate reaction for boron is the color which the fluoride of boron imparts to the non-luminous flame of a Bunsen burner. To avoid some of the difficulties encountered in the usual manner of applying this test, H. Kæmmerer recommends the following method of obtaining the fluoride of boron: The substance to be examined is mixed with flour spar and silicic acid or powdered glass, and placed in a test tube, which can be closed by a perforated cork carrying a small delivery tube, bent at right angles and drawn out nearly to a point. Concentrated sulphuric acid is poured into the tube and the cork inserted. The gas which escapes is allowed to enter the non-luminous flame, when the green color will indicate the presence of the boron. With minute quantities of boron, a piece of marble may be thrown into the tube to drive out the air and keep up a constant stream of gas, so as to obtain all the fluoride of barium that is formed.—*Jour. of Applied Chemistry.*

1175. A Power Supplying Company.—The Roch-

ester (N. Y.) Hydraulic Company is an incorporated institution, o ≥ ning more than half a million dollars' worth of real estate; it carries on no manufacture, but rents its buildings to various manufacturers, supplying the power to them from the water flowing in the river beside the shops. A short time ago the rock was cut so as to make a deep well, and two of the largest water wheels, yielding over 1000 horse power, were placed therein. It is the intention of the owners to add another wheel, which will swell the power attained to over 1,500 horse power.—*Commercial Bulletin.*

1476. Petroleum in Galicia.—The exploitation of petroleum in Galicia dates from 1860. Oily matter has long been observed in the rocks, on the surface of stagnant water, etc., in the neighborhood of Balioka. M. Sukasiewith distilled some of these and discovered that petroleum was present. Since that extensive refining works have been established. The wells are not over 100 meters (330 feet) deep. The oil is pumped from the wells, each one yielding from 300 to 600 kilos. (100 to 200 gallons) daily. Some exceptionally rich yield 3,600 to 6,000 kilos. daily. Salt water almost always accompanies the oil.—*Amer. Chemist.*

1177. Deep Mining.—It is in coal mining that the greatest developments in deep working are now taking place. In Belgium the shafts descend 100 meters (330 feet) every ten years, on the average, and individual mines, of course, are carried down more rapidly. One in Belgium is more than 3000 feet deep. In some remarks before the Society for the Encouragement of Material Industry, in Paris, Prof. Gruner said that the extraction of coal throughout the world amounted to 240,000,000 tons yearly, which might be valued at 10 francs at the mine. This gives a total value for coal of $480,000,000 (gold), while all other mining products taken together do not exceed $320,000,000 in value.—*Engineering and Mining Journal.*

1178. Nitrogen and Plants.—In a notice of Deherain's work on agricultural chemistry, recently published, the important question is raised—In what form is nitrogen assimilated by plants? Kuhlmann maintains that nitrates are not taken up until reduction has taken place, and their nitrogen has entered into an ammoniacal combination. On the other hand, Cloez holds that ammoniacal salts are inactive till their nitrogen has passed into a nitro-compound. Neither of these views has as yet been demonstrated. M Deherain combats the view of M. Ville that plants can assimilate directly the free nitrogen of the atmosphere, but he holds that in soils containing decomposing organic matter, the nitrogen of the air forms ammonia in the absence of oxygen. Carbonic acid is formed, and the nascent hydrogen unites with the atmospheric nitrogen to form ammonia.—*Chemical News.*

1179. Corrosion of Iron.—Mr. E. W. Binney, Vice-President of the Manchester Literary and Philosophical Society, exhibited some portion of the cast iron roof from the Salford Station of the Lancashire and Yorkshire Railway, which, after having been up for a period of four years, was so much corroded and damaged that it had to be taken down. He attributed the effects to sulphuric acid and soot arising from the combustion of the coal used in the locomotives passing under it, aided by the action of steam and vibration. He referred to a paper by himself communicated to the society on the effects of old coalpit water on cast iron, where similar results had been produced by sulphuric acid, carbonaceous matter, and water: also to a case alluded to by one of the most distinguished members of the society, the late Dr. W. Henry, of the rotting of cast iron by the escape of steam from the junction of a pipe embedded in charcoal. Of course the rate of decomposition much depended on the quality of the iron.—*Iron.*

1180. Ammonia and Carbonic Acid in the Air.—In a recent communication to the French Academy of Sciences, M. Trouchot stated, as the results of observations made at Clermont-Farrand, about 1330 feet above the sea, at the summit of the Puy-de-Dome, 4880 feet, and the Pie-de-Sancy, 6680 feet, that the amount of carbonic acid in the air diminishes with altitude. He now finds, by a similar series of experiments, that, singularly enough, the diffusion of ammonia in the atmosphere follows a directly opposite rule. Thus the air at Clermont-Farrand contains from $1\frac{1}{4}$ to $2\frac{3}{4}$ milligrammes of ammonia per cubic meter, the quantity being greatest during the prevalence of mist or gentle rain; the air at the summit of the Puy-de-Dome gave 3 1-5th milligrammes in bright sunshine; and that at the top of the Pie-de-Sancy $5\frac{1}{3}$ milligrammes in the sun, and more than $5\frac{1}{4}$ during a mist.—*American Chemist.*

1181. Oxygen and Germination.—Prof. Joseph Bohm has communicated to the Academy of Sciences of Vienna some curious and interesting observations on vegetable physiology. He has found that young plants produced from seed germinating in pure oxygen gas of ordinary density speedily die, although they continue to consume oxygen to as great an extent as when they are growing in atmospheric air. The young plants thrive, however, in pure oxygen when the density of the latter is reduced so as to represent only a pressure of about six inches of mercury, or when pure oxygen of ordinary density is mixed with four-fifths of its volume of hydrogen. Professor Bohm has also investigated the action of carbon upon the growth and greenness of plants, and found that an intermixture of only 2 per cent. of carbonic acid in the air in which plants are growing suffices to retard the formation of green coloring matter (chlorophyl), and that the process is almost or entirely suppressed in an atmosphere containing 20 per cent. of this gas. No germination of seeds took place in an atmosphere consisting of one half carbonic acid.—*Mining and Scientific Press.*

American Water-Gas Researches.

REPORT OF PROFESSORS SILLIMAN AND WURTZ.

[Continued from page 169, Vol. 20]

AMMONIA AND OTHER INCIDENTAL IMPURITIES IN THE HYDROCARBON GAS.

Ammonia was never present in the Fair Haven gas in quantity sufficient at any time to discolor turmeric paper.

A careful determination of ammonia, from the slow passage of nearly 100 cubic feet of the gas, extending over a period of four days, through an apparatus containing diluted sulphuric acid, with all the precautions needful for accuracy, gave, for 100 cubic feet of the gas, 0.521 grains of ammonia, or about one tenth only of the quantity allowed by the English law.

In the New Haven city gas, made with the same coals, viz., Westmoreland, with about six per cent. of Albert, the amount of ammonia found in the same manner was 0.9297 grains for 100 cubic feet of gas. The latter gas not unfrequently discolors turmeric paper, and at such times it contains probably more ammonia than is here quoted.

The analysis of the ammoniacal liquors from the two modes of production offers some curious points for the attention of those interested in the purification of gas, and suggests important considerations touching the reactions which take place in the hydrocarbon process.

Two samples collected from the gas-works at about the same time, gave the following figures:

Table V.

Samples of	Specific Gravity.	Ammonia per gallon.	Carb. Acid per gal.
New Haven gas liquor, March 13, 1869.....	1.011	619 grs.	356 grs.
Fair Haven gas liquor, March 10, 1869.....	1.032	1,420 "	2,039 "

The remarkable character of these results is obvious, not merely in the far larger condensation of ammonia from the gas by the hydrocarbon process, but still more strikingly in the retention by the gas liquor of nearly *six times as much carbonic acid* in this as in the ordinary process. Hence the high degree of purity which we have invariably found the compound hydrocarbon gas to possess, apart from the accidental air contamination. That, notwithstanding the frequent investigations made heretofore by gas-chemists into this subject, these facts should have been hitherto overlooked, is not the least extraordinary circumstance. Indeed, heretofore, the objection most strenuously urged against all forms of water-gas, has been the supposed impossibility of purification from the contaminating carbonic acid. We find now, however, that by the process we have used, it actually, in great measure, purifies itself; insomuch that almost nothing is left to be accomplished by the purifying agents but the removal of the sulphur. Theoretical views regarding the principles involved in this new discovery in gas purification, are held by us (such views having led, indeed to the institution of the analyses cited above), and will be, in due time, brought before the chemical world. We shall, in addition, point only to the interesting reflection here prompted, that in the history of this improvement, as has not uncommonly occurred in the history of other human arts, an element which, in the earlier stages of progress, has constituted the greatest obstacle to practical success, is afterwards found to involve, when properly understood and controlled, one of the actual essentials to complete success. It is, without doubt, the presence of the larger amount of carbonic acid relatively to the ammonia, together, it may be, with the presence of a larger amount of steam in the condensing vapors, that leads to the greater deposition of the ammonia at this stage; the prevention of its passage on in the form of sulphide of ammonium to the purifiers; and the diminution thus of the work remaining to be done by the latter. It follows that the effete lime from the purifying boxes, when the hydrocarbon process is employed, should be found much less charged with ammonia and sulphide of ammonium than ordinarily. In a qualitative way, we have satisfied ourselves that this is actually the case, but are not yet prepared to offer numerical results, and defer, therefore, for the present, any further discussion on the subject: convinced that gas engineers will see from what has already been stated that there is here indicated a positive result of great practical importance in the art of gas purification.

We ought not to omit to mention, however, in this connection, another fact which strongly confirms the views above expressed as to the almost complete removal of the ammonia by the action already explained. It is this—that the gas at Fair Haven was not washed or scrubbed at all. The use of the washer was discontinued entirely from the moment we obtained evidence of this important re-action in the stand pipes and hydraulic main, and the gas went direct from the condensers to the purifying boxes without contact with water.*

* It is important to add, respecting the subject of purification, that the purifying boxes at Fair Haven were not in such condition as to enable us to obtain the maximum effect of the lime used, by any means. To purify 356,700 cubic feet of gas 100 bushels of lime were used, or 3,567 cubic feet to one bushel. In the New Haven Works, using the same coals, in all the year 1868, the amount of gas purified to one bushel of lime, was nearly 6,000 cubic feet.

At the Manhattan Gas Works, in New York, the average is about 3,800 feet per bushel, using chiefly "Westmoreland" or "Penn" coals for two-thirds, and Cow Bay (Blockhouse) one-third. But the latter is a very sulphurous ("dirty") coal, while the Westmoreland and Albert are remarkably clean of sulphur. Alone, the Westmoreland coal gives a gas of which one bushel of lime purifies 6.240 cubic feet. (See notice of Westmoreland coal—this Journa. for March 2, 1874, page 75.

Ample opportunities will soon offer to study this whole subject under greatly more favorable conditions than we have enjoyed, even in the very considerable scale of our operations at Fair Haven. The New Haven Gas Light Company having decided to adopt the hydrocarbon process in their works, we shall soon have such a number of benches of five retorts each at work, as will give the full solution of these and other equally important practical points.

In view of the question of the adoption of this process of gas-making, the New Haven Gas-Light Company had the operations at Fair Haven under the immediate direction of their intelligent and very successful manager, Mr. T. M. Cox, after the 1st of March; and the result recorded in Tables D and E, appended, are those obtained by Mr. Cox, upon the basis of which his Company, by his advice, determined to transform their Works at New Haven, and to adapt them to the Gwynne-Harris process.

SULPHUR IN THE GAS

The presence of sulphur compounds was never detected at any time during our experiments at Fair Haven, when tested for by the usual methods with lead paper. But by a slight modification of Dr. Letheby's form of combustion apparatus, conducting the examinations with all the usual precautions, the quantity of sulphur found in the Fair Haven gas did not exceed four grains to the 100 cubic feet of gas burned. The smallest quantity, determined on about 34 cubic feet of gas, was sulphur 1·691 grains to the 100 cubic feet; and the largest quantity was 3 965 grains to the 100 cubic feet.

In the New Haven city gas, the quantity of sulphur on the 11th of February was 5.21 grains per 100 feet, the gas being from the same coals.

The English law allows 20 grains of sulphur to the 100 cubic feet.

BISULPHIDE OF CARBON.

This impurity, often spoken of as a contamination of coal gas, was in vain searched for in the hydrocarbon gas at Fair Haven. The method employed was that recommended by Bowditch; by passing the gas for a long time in a slow and regulated current through alcohol heated to 160° Fahr. It is extremely doubtful if carbonic disulphide can exist in gas well purified by hydrate of lime. We have never found it. The sulphur compounds in the gas which appear as sulphurous acid on combustion, are undoubtedly sulphuretted bases, as yet but imperfectly known.

CARBONIC ACID IN THE GAS.

Daily testings for this often-occurring impurity in coal-gas, failed to detect a trace in the hydrocarbon gas at Fair Haven: except on a single occasion, when the purifiers were out of order. Even then the quantity was inconsiderable.

In view of the annoyance which was experienced in the English experiments on the hydrocarbon gas, from the constant presence of this impurity, and the disastrous effect it had in destroying the value of the light; we were very careful to avoid any possible error on this point. It appears to be almost entirely removed in connection with the ammonia by this process, as already explained previously. This absence of carbonic acid from the purified hydrocarbon gas is not the least satisfactory of all our results in this research.

ACETYLENE.—Marked traces of this hydrocarbon were detected in the hydrocarbon gas at Fair Haven, on many occasions, but its presence cannot be regarded as of much practical importance.

[To be continued.]

Heating by Gasogens.

The following are the results of experiments made with a boiler of 52 square metres of heating surface, which took place in the workshops of a M. Muller, of Ivry. The experiments were made with two boilers of exactly the same dimensions placed close to one another, and worked together. The first had an ordinary furnace with fire-bars; the second was furnished with a gazogen.

The first showed a maximum evaporation of six kilogrammes of water for one kilogramme of coal, with 12 per cent. of cinder. The second has constantly given an evaporation which has varied from 8·65 kilos. to 9·22 kilos. per kilogramme of gas. The mean during two months was 8·36. The consumption was about 100 kilos. per hour. The cleaning takes place after twelve hours of work, when the boiler works day and night, which is always the case during the frosts, when it is necessary to send the steam through the pipes of the linen-driers.

When there is no occassion to heat during the night, the access of air to the gazogen should be shut off two hours before the stoppage of the machine; at the same time the supply of gas and the chimney damper should be closed. As there is, during work, no passage of air in the furnace across the walls, and there is no draught, the brickwork of the furnace gets much hotter than in ordinary boilers, and if the fire is stopped at the same moment as the engine, the pressure rises very much in the boiler for hours. In the case of boilers with internal flues, without much firebrick, this effect would not be produced.

It is proved further, by multiplied observations, that in the gas furnished by the gazogen there is seldom any trace of carbonic acid, sometimes half per cent., rarely one per cent. In the products of combustion there is no trace of carbonic oxide unburnt, and seldom any trace of free oxygen. With some coals, however, it is necessary to leave in the gas one per cent. to one and a half per cent. of free oxygen to obtain absolute smokelessness. This is the case specially when fat bituminous coals are being burnt, of which the gas is difficult to burn. In the course of the experiments it was fully proved that all varieties could be employed in the gazogen, but the shape and dimensions of the apparatus must be suited to the fuel employed.—*Iron.*

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—ED.

The Iola Gas Well.

LAWRENCE, KANSAS, June 16, 1874.

Mr. Editor: The following account of a gas well made by boring in Iola, Allen county, Kansas, may be of interest to your readers. It was sunk in hopes of reaching a working seam of coal; is situated some 300 feet from the L., L. & G. railroad, just at the edge of the town, was commenced in October, 1872, and had reached a depth of 763 feet by the next March, when boring was stopped. The only coal found was a six inch seam at a depth of 710 feet, although a four and a two and a half foot vein of bituminous shale were found at 208 feet and 242 feet.

At the depth of 626 feet, a cavity of twenty inches was reached over and under-laid with a thin oil-bearing shale, from which issued a strong discharge of gas and salt water. The well was so piped as to cause all these discharges to take place through a one inch gas pipe.

On visiting it some weeks since I found it vigorously at work, alternately spouting forth these two products. By means of an extempore holder I found its yield of gas to be between 6,000 and 7,000 feet, and that of the water 260 cubic feet per day.

Eudiometrical experiments indicated the presence of only about two per cent. carbonic acid, no carbonic oxide, and but a trace of hydrocarbons condensible by bromine. With a wide-slit bat-wing burner, and a flame as large as the hand, burning under a low pressure, the light was only equal to one candle. Though with an argand burner with a chimney contracted at the top, and a consumption of about three and a half feet per hour, I obtained a flame of about two and a fourth candles.

This gas may be utilized for lighting the town by passing it over naphtha, but I should suppose that it could be made to pay a better profit by using it as fuel for steam purposes in one of the manufacturing establishments near by. Respectfully yours,

FRED. E. STIMPSON.

Soot in Retorts.

EASTERN LUNATIC ASYLUM,
WILLIAMSBURGH, VA., June 30, 1874.

Mr. Editor: As editor of the AMERICAN GAS-LIGHT JOURNAL, I wwould like to ask this question: What is the cause of so much soot in retorts generating gas from resin? We have a small machine for the use of the hospital; we make gas once in four days, and at the end of each making the retorts are very nearly full of soot. If you can give me any light on the subject it will be very thankfully received. Many thanks for the Journal. Respectfully yours,

GALBA VAIDEN.

Gas-Light Journals.

The first periodical devoted exclusively to the spread of information amongst persons engaged in the supply of gas was established in London, in 1846, by the late Mr. Thomas Greaves Barlow. It was entitled the *Gas Gazette;* but the work did not receive much support from the profession, and, after the issue of 5 or 6 numbers, it was abandoned.

In February, 1849, Mr. Barlow established the *Journal of Gas-Lighting*, which, at the commencement, was published quarterly, with an intermediate supplement on the 10th of each intervening month. The first number was remarkable for containing a very able and comprehensive article, from the pen of the editor, proposing the amalgamation of the metropolitan gas companies, the majority of which, at the time, were in fierce competition. It was further remarkable on account of an excellent article, by Dr. Fyfe, "On the Comparative Value of Coal for the Purpose of Illumination;" and lastly for the introduction to the notice of the gas world, of the late Alexander Wright (who afterwards attained an eminent position in the profession), by the publication of an article by him, "On Coal and its Products by Distillation."

Both these gentlemen were able contributors to the Journal for some years. To Dr. Fyfe is especially due the merit of making known the errors, or fallacies of the hydrocarbon gas process, at a time when the greatest uncertainty existed as to its value. The labors of Mr. Wright are so well known as not to require mention here, although, when treating on various subjects, we may have occasion again to refer to him.

The services which Mr. Barlow rendered, through the medium of the Journal, to gas companies, has so recently been sketched by an able and esteemed coadjutor of the late editor, that it is needless now to expatiate upon them. The advantages that have aris n from the liberal exchange of ideas between engineers, and others, in these columns, the value of the general information which the Journal has systematically conveyed to its readers, for now more than a quarter of a century, concerning the manufacture and distribution of gas, and the various inventions and improvements connected therewith, is sufficiently attested by the steady and continuous progress ln its circulation, and the position to which it has attained.

In 1852, the first number of *Le Journal de l'Eclairage au Gaz* was published in Paris, and in 1857 a second French periodical, entitled *Le Gaz*, devoted to the same subject, was established. In 1858 the AMERICAN GAS-LIGHT JOURNAL made its first appearance, and in the same year the *Journal fur Gasbeleuchtung* was started at Munich. All these publications still exist, and are very ably conducted.—*London Journal of Gas-Lighting.*

British Gas-Purification Patent.

"Improvements in the purification of gas, and in the extraction of residual products therefrom."—A. G. V. Harcourt, Oxford, and F. W. Fison, Ilkley, Yorks. Patent dated August 13, 1873.

The objects of this invention are—1. To purify illuminating gas from sulphuretted hydrogen and from ammonia, by the application of a mixture of materials which may be dealt with as one substance, and used to remove both these impurities without necessitating the employment of separate purifiers or the arrangement of different materials in separate layers. 2. To dispense with washing or scrubbing. 3. To use the same quantity of oxide for any length of time. 4. To obtain sulphur and sulpbate of ammonia economically.

To purify gas from sulphuretted hydrogen, hydrated peroxide of iron (hereafter termed "oxide") is employed, and to purify it from ammonia a solution of persulphate of iron is used, which is prepared from time to time by dissolving a part of the oxide in dilute sulphuric acid. To apply this liquid to the removal of ammonia, it is sprinkled over the oxide during re-

vivification, and before the oxide is replaced in the purifier.

Thus the purifier is charged with a mixture of oxide and persulphate of iron each of which acts independently. The oxide absorbs sulphuretted hydrogen, forming sulphide of iron, water, and sulphur; the last-named substance (formed also during revivification) accumulates, and, after a certain proportion has been reached, must be removed as fast as it is formed. The persulphate of iron absorbs ammonia, forming sulphate of ammonia and oxide. The sulphate of ammonia also accumulates as the process goes on, and must be kept down by the extraction of portions from time to time. The amount of oxide in use remains constant, since all that is removed for conversion into persulphate of iron is restored by the addition of persulphate thus formed to the contents of the purifier and its reconversion into oxide by the action of ammonia.

The treatment of a part of the purifying material taken out of the bulk of that exposed for revivification, in order to remove and obtain from it sulphur and sulphate of ammonia, and to obtain persulphate of iron, which, in turn, arrests ammonia and is reconverted into oxide, is the distinctive feature of this invention.

The process by which this is effected consists in extracting the material, first with water, which dissolves out the sulphate of ammonia; and next with dilute sulphuric acid, which dissolves the oxide, forming a solution of persulphate of iron. The undissolved residue consists of sulphur. By evaporating the solution of sulphate of ammonia, and by washing and drying the residue of sulphur, these substances are obtained at once in a saleable form.

It is proposed further, as a desirable but not indispensable addition to the processes already described, to convert the ammonia and ammoniacal salts of the liquor from the condensers into sulphate of ammonia (reuniting this portion with the rest of the ammonia formed in the retorts), by heating the liquor by itself, or mixed with lime in a vessel through which a current of gas passes to the purifiers.

Unpatented Process for Making Gas from Petroleum.

As an addition to the already voluminous literature upon the subject of illuminating gas, we give for what it is worth, (and we think it is worth very little) the following suggestion from the Titusville *Herald*:

There are unquestionably many excellent and practical mechanical contrivances for making a pure and fixed gas of high illuminating power out of petroleum, but the cost of the gas is greater than that derived from coal, and can only be compared to the rosin gas which has been in use for half a century. It is, however, not a patent process, mode, method or mechanical device which will eventually be used for this new purpose, as coal gas companies and capitalists find the machinery so inextricably befogged with law suits in embryo that they will not touch any of it. There must, therefore, be some broad principle, aside from any patent, brought forward which every one can use with economy, and in which there will be a free and open competition, without fear of being pounced upon by half a dozen patentees, and this seems to be already foreshadowed by the following simple process:

The cost of making good coal gas is in direct proportion to the amount of carbon in the coal from which it is made. Carbon is the illuminating principle, and carbonic oxide and hydrogen are the dilutants. After the coal has been left in the retort for a few hours the dilutants become much greater in quantity and the carbon less, and the retort has to be opened, the coke removed and a fresh charge put in. The coke, as it comes from the retort, still contains a large amount of gas, but not sufficient carbon to render it useful for illuminating purposes. Coke, as everybody knows, is very light and porous, and is capable of absorbing a large amount of fluid. To supply it with fresh carbon in this condition would seem at first difficult, but all that is necessary is to saturate it with crude petroleum and afterwards roll it over in dry pulverized clay until the moisture is entirely absorbed. It will then be in a condition to give off a larger amount of illuminating gas than in its natural condition of bituminous coal. The petroleum used for this purpose should be that from which all the volatile or lighter portions have been driven off, and petroleum tar mixed with heavy oil answers an excellent purpose. This principle is not the subject of a patent, and it can be used in any coal gas works on a days' notice, and without the slightest alteration of the machinery. When the price of crude oil is low, it may be used with economy, but when the market takes a jump, so as to make it too costly, the process can be at once abandoned without loss, or resumed again, as occasion or circumstances will admit. —*National Oil Journal.*

Petroleum-Gas at Shamokin, Pa.

These works are being built by Mr. J. D. Patton, in conjunction with one or two of our prominent citizens, and are to be on the same general plan and of the same capacity as those in Sunbury. They will make a fixed gas from crude naphtha, or crude petroleum, which gas is produced in retorts, patented by Mr. Patton, and heated to a bright red heat. It will stand any amount of cold or pressure without condensing, is less variable than coal gas, and totally different from the gas produced by the various gas machines, which will condense whenever subjected to great pressure or cold.

The conditions under which the council granted the right to lay pipes, stipulated that the price for light furnished shall not exceed one and a-half cents per hour for a fourteen candle flame which is equal to the cost of good ordinary coal gas at $3.00 per 1,000 cubic feet. The gas meters to be used will register this amount in dollars and cents, so that every consumer can see at any time how much money his light is costing, or can tell for himself if his meter is registering correctly. Gas meters on the old or cubic foot plan have not a good reputation for truthfulness, but, unfortunately, there is no easy way to prove that they are wrong. Whereas the dollar and cents meters can easily be tested by each consumer at pleasure. The price named is considerably lower than the average throughout the State and the citizens of Sunbury who have been using this light for nearly three years praise it warmly. Mr. Patton is building works of the same sort to supply Mahanoy City, and for the Philadelphia & Reading Railroad Company at Reading, in both of which cases close investigation was made as to the economy, safety, and general desirability of this gas. The P. & R. R. Co. will use it for lighting their extensive buildings at Reading, and also for their passenger cars instead of the coal gas now used. For car lighting it is so far superior to coal gas that when compressed into a cylinder under the enormous pressure of 250 lbs. to the square inch, the burner consuming it gave a light equal to 12 candles, while coal gas consumed through the same burner, and at the same rate and pressure, gave less than one candle light.

Now that we are to have gas we hope the Council will lose no time in having our streets lighted, and we would suggest that (as many of our citizens have already erected, as matters of private enterprise, lamp posts,) which they will no longer need when the streets are lighted with gas, but which will answer for the Borough as well as new ones, the Borough should purchase such of these posts as the owners wish to dispose of, at cost price, and have them ready for gas as soon as it comes.—*Shamokin Herald.*

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Franklin Foundry and Pipe Works—Jas. Marshall & Co., 23 Nineteenth street, Pittsburgh, Pa.....2
Gas Valves (Chapman) 75 and 77 Kilby St., Boston, Mass.....3
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Gas Purification—St. John and Cartwright.....5
Gaylord Iron and Pipe Company—90 and 92 Broadway, Cincinnati, Ohio.....9
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Gas Screens—American Gas Screen Manufacturing Co., Haverhill, Mass.....4
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The Newburg Orrel Coal Co.—Chas. W. Hays, Agent in New York, Trinity Building, 111 B'way, Room 7.....6
Tyrconnell Gas Coal—52 S. Gay Street, Baltimore, Md.....6

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Cast-Iron Pipes and Fittings—B. S. Benson, 52 East Monument street, Baltimore, Md.....5
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Gloucester Iron Works—J. P. Michellon, Sec., 6 North 7th street, Phila., Pa.....2
National Foundry and Pipe Works—Wm. Smith, Carroll, Pike, Smallman & Wilkins streets, Pittsburg, Pa.....6
Pascal Iron Works—Morris, Taskar & Co., Philadelphia....12
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Gear Wheels—Scott, 98 Chambers St., N. Y.....5
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Scientific and Practical Chemist and Geologist—Profetsor Henry Wurtz, 12 Hudson Terrace, N. J.....2
Works upon Gas—D. Van Nostrand, 23 Murray street and 27 Warren street, N. Y.....9
West End Supply Company—Chas. H. Brown, 25, 27 and 29 North 20th street, Phila, Pa.....8

A New Bunsen gas buaner has been recently invented, which gives a heat of about 3,000° Fahr. A furnace of thirty burners generates steam enough to run an engine of one and a half horse power.—*Scientific American.*

THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY.

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(Immediately fronting the Ferry Houses.)

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THURSDAY, JULY 16, 1874.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

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NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

The Semi-annual Meeting of the Association will be held in Tyler's Hall, No. 332 Chapel Street, New Haven, Conn., on Wednesday, August 12, 1874, at 12 o'clock, noon.

The headquarters of the association will be at the New Haven House, Chapel Street.

GEO. B. NEAL, Secretary.

[We trust that the New England Association, which meets this time in so convenient a location, will have the attendance of all gas men who can get there. We have a "shrewd suspicion" that, on this occasion, some emulation will be exerted, in view of the results of the Cleveland meeting, to bring out something which will be creditable to the profession in America, and which will sustain the honor of the land of the Pilgrim Fathers, and of the "men of Boston raising." They will, we trust, show the world what they can do in the way of enlightened progress.]

NEW YORK GAS MATTERS, AND THE HEALTH BOARD.

It would appear, from the piece-meal items we get, in the public journals only, about sanitary movements in New York City, that there has been of late some renewed stir in the Board of Health in reference to gas matters; and a conclusion has at last been arrived at, identical with that which the Editor of this Journal came to six years since, and embodied in a Report on Purification, made at that date (1868) to the Manhattan Gas-Light Company.

[This Report, which we flatter ourselves was somewhat ahead of the age, at that time, contained many points that we have occasion to recur to nowadays. Strangely enough, though copied into the London *Journal of Gas-Lighting*, it never yet appeared in these columns. It is therefore borne upon our mind to exhume it and put it, even at this late day, before American readers].

The conclusion we now refer to relates to the true source of the vile sickening stenches that sometimes spread over New York and the surrounding country; which, from their suggesting that of a fouled gas purifier, have been always attributed by the people (as well as by the Board of Health) to the gas houses. The present writer, as aforesaid, first referred these stenches to their true sources, in the Ammonia-Works, chiefly established for convenience, in proximity to the gas-works themselves; where the ammoniacal liquor is doctored, to make from it sulphate of ammonia. The method of doing this here has generally been to pass steam through the foul liquor, and subject the gases and vapors thus evolved to absorption by sulphuric acid, which takes up the ammonia, but lets slide some certain compounds yet unknown, of an intensity and persistency of nauseating odor beyond the power of pen to depict, except by means of comparisons too unsavory for any polite page. It would appear that the Board of Health are now fighting it out with the ammonia-men, who of course promise everything, and honestly try every expedient that is promising, but don't just quite succeed at the first jump, and want to "try try again." We opine that *we* shall have to mingle again in this melee, before it is going to be finally and satisfactorily fought out. A complete revolution must be instituted in this ammonia-matter, and affairs are ripening therefor.

Further, regarding our City Gas Works, we have the singular announcement that Assistant Sanitary Superintendent Janes, and Inspector Goldsmith, have been engaged in a careful study of their processes, and promise a report. If we can get hold of this report, we shall of course do so, and doubtless our readers will be as impatient as we are, to get sight of this formidable coming document.

SANITARY AND OTHER MATTERS IN NEW JERSEY.

The last New Jereey legislature initiated a number of attempts at regulation of matters relating to improvements, of general and not merely local importance, indicating altogether a tendency towards progress, worthy of encouragement. Some of these we may probably flatter ourselves that we were in some degree instrumental in suggesting. In the Editor's Report on the Passaic Water, it may be remembered that the salvation, so far, of the water and of its imbibers, was attributed largely to *swarms of fish* which populate the stream, especially in the neighborhood of the water works, and which devour large quantities of the animal putrefiable matters that drain into this stream from Newark and other towns. The passage into the river of gas tar at some points was also referred to. It appears now that a supplement was enacted:

"That it shall not be lawful for any person or private corporation to discharge into the river Passaic, within the boundaries of the counties Essex and Hudson, any petroleum or rock oil, or coal-tar."

It is also stated that this river has been "stocked with salmon, black bass, and trout," and that an enactment prohibits fishing for three years. This is curious action, and we do not believe can have any influence in redeeming the river, at least in its most important part, whence the water is pumped to supply the people of Newark and Jersey City. The fish mentioned are not famous for thriving and breeding in sewage-polluted streams, and our own expectation is that some day soon the fish already in the channel of the lower Passaic, which are now crowded, probably more than is good for them, will suddenly die out and disappear, and that the channel will then become little more than a putrid ditch or open sewer. If the people interested will take the matter in hand at once, they have remedies before them, but delay here will be dangerous in the extreme.

Other sanitary measures taken were the creation of a Board of Health for Hudson County, which includes all the territory opposite New York, which Board is now organized, so far as it goes, very well; but it does not go by any means far enough. In another year probably, by some supplementary action, a powerful and efficient Board may be perfected, of the greatest benefit to this section, which sadly needs sanitary regulation of every kind.

Another New Jersey measure was a general gas bill, which we have been endeavoring to get room to put before our readers, probably with some comments.

Another thing is that the beautiful Palisades are no longer to be desecrated and made repulsive by quack medicine and other advertisements.

"KALOSIC" GAS.

The Greek word *kalos* means *beautiful*, also, however, *good*, and *useful*. Mr. Isham Baggs, the English inventor, doubtless believes his new

gas, for which he has coined—or paid somebody for coining—the above name, to be all three of these. As for ourselves, we must be allowed to reserve our final opinion on the subject for a little space. Certainly we cannot be expected to keep our readers posted in the literature of the subject, which apparently fructifies so fast that it bids fair to need a journal of its own ere long.

Some of our readers, nevertheless, doubtless do not know, and will expect us to tell them, what this new (?), beautiful, good and useful gas is. So far as we can make out—not having the actual specification of the patent, but putting together this and that, in the voluminous discussions of the subject—it appears to be made by *passing air over incandescent coke* and then imbuing the product with petroleum-naphtha vapor. Of course the oxygen of the air gives us twice its volume of carbonic oxide, so that the result (theoretically) is a mixture of one volume of this gas with two volumes of nitrogen. This mixture will of course tell a better story than air itself, when naphthalized—but, as aforesaid, we don't propose to pass judgment just yet.

The great expectations that are put forth, regarding the "kalosic," would alone occupy far too much of our space to reproduce in full. As thus, for a few specimen bricks—250 cubic feet upon pumice, fire-clay, or corrugated metal in an ordinary stove is going to produce for twelve hours a large and most cheerful fire, the cost of which will be for the whole period, one-half-penny (or one cent.)

It will "inevitably supersede coal for all household purposes." It "will effect a complete revolution in the raising of steam for purposes of motive power by sea or land. Whether for stationary or locomotive engines, or for sea-going steamers, its results will be equally manifest, doubling at once the commercial effectiveness of the existing steam marine of this and every other country." As to its illuminating capacity and cost, 30-candle power for twelve cents a thousand feet, is talked of, but a few cents more or less will be inconsequential.

We don't know the amount of the capital stock of the "limited liability" company that has of course been formed; but, judging from the above figures, it ought not to be "limited" to anything.

THE CALL FOR THE CENTENNIAL OF CHEMISTRY.

TO THE CHEMISTS OF AMERICA.

The year 1774 was rendered memorable by the discovery of oxygen by Joseph Priestley, by researches on chlorine by Scheele, and by important investigations undertaken by Lavoisier, which eventually led to the overthrow of the phlogistic hypothesis; the most important link in the chain having been contributed on the first of August, 1774, by Dr. Priestley.

The one hundredth anniversary of Priestley's brilliant discovery now drawing rapidly near, is worthy of a commemorative ceremonial; and the fact that this illustrious man spent the last years of his fruitful life in this country renders the recognition of his work by American chemists peculiarly appropriate.

A re-union of American Chemists for mutual exchange of ideas and observations would, it is believed, foster a feeling of fraternity among us, and is considered by the undersigned eminently desirable. The approaching centennial affords a fitting occasion for such a gathering. We therefore invite the Chemists of America, to meet at Northumberland, Pennsylvania, where Priestley lies entombed, on the 31st of July, 1874, to celebrate by appropriate exercises this memorable epoch in the history of chemistry.

[Here follows a list of signers of the call—comprising the names of 38 chemists—including many of the most distinguished in America.]

Besides the exercisvs announced in our last, it is expected that Professors Croft of Toronto, and Sterry Hunt of Boston will deliver important addresses.

The Circular of the General Committee will be forwarded to any gentleman of chemical attainments who will apply to the Editor of this Journal, or to any of the other members of the Committee. This circular entitles the holder to a ticket obtainable in New York (526 Broadway) to and from Northumberland at $8.50, a large reduction. Gentlemen should reach Northumberland on the evening of July 30th.

THE GREAT PETROLEUM FIRE.

The Weehawken oil tanks struck by lightning; 125,000 barrels of oil burnt; carpenter's and cooper's shops, docks, etc., burnt: loss immense; danger imminent; but all the shipping saved, and no life lost. The question which immediately arises is, with regard to this last point, was it *really* fortunate? Suppose that there had been loss of life, this time, would it not have probably been a saving of life hereafter?

We appear to be, in this matter of tanks for storing petroleum, working by a very dangerous kind of "rule of thumb." Lightning has already struck these same tanks before, and seems therefore to have a pronounced fondness for the place; nevertheless the Erie Railroad Company, it is announced, are proceeding at once, without any investigation, to rebuild iron tanks and reestablish everything as before. Petroleum tanks in other sections, it would appear, are also peculiarly liable to strokes of lightning. Why this is thus, it seems difficult to say, but why it is that when a petroleum tank *is* struck, fire results, whereas when a gas holder full of gas is struck, no harm usually ensues, is easy of comprehension.

The oil (crude oil at least) is continually giving off gaseous emanations, which would burst the tanks, if, like gas-holders they were closed over air-tight; therefore each tank has a sort of a syphon-shaped vent or exit pipe, open to the air. Through this there is a continual effusion of gas and naphtha-vapor, in condition to be fired by the least electric spark. Thus notwithstanding the mass of iron involved, which otherwise would carry off the electricity harmlessly, fire and explosion always follows.

Such oil-tanks should be altogether enclosed, it is clear, and means provided for conducting the gas off harmlessly. Our opinion also is that they should not be built of iron, but constructed of *wood*, so prepared chemically as to be fireproof and oil-proof. The safest and most correct methods, however, of storing petroleum will only be arrived at quickly by thorough and systematic experimental investigation of the subject. Otherwise such methods will be the fruit of long, costly, and destructive and probably deadly experience only. Hence the doubt we expressed above whether the surprising fact that no life was lost by the late tremendous occurrence at Weehawken was not really a bad augury for the future. Had there been fatal casualties, an investigation might have resulted leading to some better understanding and safer methods of storing.

LATER.—Since the above was put in type, an editorial, conveying similar views, has been encountered in the New York *World*. The *World* writer, however, did not know of the open exit pipes and the current of vapor flowing from them which is kindled by the flash. He says the question how to avert such consequences in the future might well become a serious one, recommend its *investigation*; but will doubtless have to "take it out" in recommending.

A BALLOON JOKE.

Ballunacy is by no means generally a matter of jest, and the "tricks and manners" of balloonatics do not very frequently furnish forth food for laughter; but an exception to this general rule has lately transpired in New York, which, as it is not uninstructive in a gas point-of-view, we shall here make matter of history.

Barnum announced on the Fourth of July that he was about commencing, at the "Hippodrome," a series of balloon ascensions, for the purpose of deciding the question of the asserted "easterly current." The first of these was prepared for on the 7th of July, but when everything was ready, behold, the balloon "wouldn't go up."

On examination it was found that the difficulty was lack of levity on the part of the gas used for inflation. This gas was that of the Mutual Company, which, as is well known, contains an admixture of heavy petroleum gas. Let it be remembered, we would again say, that these gases, though *homologues* of marsh gas, the lightest of hydrocarbons, are nevertheless themselves much heavier even than air. We think it probable that a mixture of one-third heavy (permanent) petroleum gas, and two thirds coal gas, might be heavier than air. Even 20 or 25 per cent. of the first—which is probably nearer to the product of the Mutual Company, would make a balloon reverse its usual behavior. Curious; when a little experiment with a soapbubble and a tobacco-pipe, would have furnished these gentlemen with a satisfactory test in a minute or two, that they should have spent a thousand dollars or so to fill a big balloon. Our great showman does not shine as a chemist.

THE ASSOCIATION PROCEEDINGS.

The Committee appointed to supervise the separate publication of the Proceedings of the Cleveland meeting are now proceeding with all due energy to accomplish their work; and desire us to announce that they will very soon have the document ready for distribution. This committee is composed of Captain White of Brooklyn, Mr. Nettleton of the East Chester Gas-Light Company, and the Secretary of the Association, Mr. Demill of Detroit.

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A number of 16 inch diameter Circular Mouthpieces, having Flanges for Clay or Iron Retorts, with wrought iron Lids to fit.

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362-2t Leavenworth, Kansas.

TO GAS COMPANIES.

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WANTED—BY A COMPETENT MAN, A POSITION as Superintendent of Gas Works. Refers to William Farmer, Esq., Gas Engineer, No. 111 Broadway, Room 95, New York. Address SUPERINTENDENT, office of this Journal. 362-unl

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OF ALL DESCRIPTIONS,
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Work warranted perfectly accurate. Send for circular giving price, and directions for ordering.
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CAST IRON GAS AND WATER PIPE

PIPE CAST VERTICAL.

1½ to 48 inches diameter.

Cast Iron Flange Heating and Steam Pipe.

STOP VALVES FOR WATER OR GAS, ALL SIZES.

Fire Hydrants,

GAS HOLDERS.

TELESCOPIC OR SINGLE.

☞ Castings and Wrought Iron Work of all kinds for Gas Works 253-6m

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Franklin Foundry and Pipe Works,

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GAS, WATER, AND OIL PIPES,

Works, 18th, 19th, 20th and Railroad Street. Office, No. 23 Nineteenth Street.

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N. B.—Pipe from 3-inch and upwards cast in 12 ft. lengths.

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FOR SALE.—TWO IRON TRUSS RETORT HOUSE Roofs, with Ventilators, complete; as good as new. One of them will cover a building 28 feet by about 75 feet; the other 30 feet by 45 feet or 50 feet, all in the clear. For further particulars address F. A. SABBATON,
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Geological Explorations and Reports upon Coal Lands, and other Mineral Properties—Chemical Analyses—Advice and Investigations in all the Chemical Arts—Chemical Inventions and Improvements made.

Prof. W. makes a specialty of GAS CHEMISTRY, and the Analysis of Gas, Gas and other Coals, and Potable Waters. Has special laboratories and unequalled facilities for these purposes. Formerly Chemical Examiner in the U. S. Patent Office, and peculiarly competent as an

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THE GAS-LIGHT CO. OF AMERICA

Nos. 63 and 64 Drexel Building,

P. O. Box, 5131. NEW YORK.

THE GAS-LIGHT COMPANY OF AMERICA, owners of the Patent Processes for making ILLUMINATING GAS from PETROLEUM and its products, known as the

Gale and Rand Patents,

are prepared to treat with Gas Companies and Manufacturers of Gas for the use of said processes.

An examination of the merits of these inventions as demonstrated by practical experience in a large number of Gas Works employing them, will not fail to convince the intelligent Gas Manufacturer of the great advantages derived from their use.

Gas of unexceptional quality, of high illuminating power is made at many of these works by these processes, at a cost of from 40 per cent. to 60 per cent. less than an ordinary qualito of illuminating gas can be made by any other methods in use. Gas Companies generally may easily, and at small outlay for making the necessary changes in manufacturing apparatus, double their net earnings, and supply a much better light to their patrons, at greatly reduced prices.

The Company respectfully refer to Companies using these processes in this city, Brooklyn, Newark, Chicago and elsewhere, and especially to the Mutual Gas-Light Company of Detroit, Mich., whose works more nearly conform in all details of construction to the original plans of the inventors, than those of other Companies.

For correspondence, etc., address to office as above.

JOSEPH M. WARD, Secretary.

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DEILY & FOWLER,

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Builders of Gas Works.

MANUFACTURERS OF

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Single and Telescopic.

WROUGHT IRON ROOF FRAMES,

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☞ Retorts set on what is known as CATHELS'S PLAN FOR SETTING RETORTS.

Retort Setters sent to all parts of Europe and America.

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GAS WORKS AND MACHINERY CASTINGS

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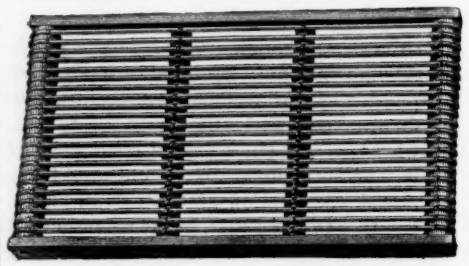
THE MANHATTAN

LIME HURDLES.



The most satisfactory results ever produced by any device used for supporting slaked lime, for the purpose of purifying coal gas.

6,800 CU. FT. OF GAS PURIFIED PER BUSHEL OF LIME.

These Hurdles combine, as no other device has, *Extreme Porosity*, with Lightness, strength, and durability.

Their *entire cost will be saved* in one seasons use, in preventing carbon accumulations in the retorts, and in allowing the *entire* body of lime to be of service.

Gas Light Companies before ordering elsewhere will find it for their interests to give these Lime Hurdles, or supports, their consideration, and a trial will substantiate the above.

We shall deliver for six months, these Lime Hurdles, or supports, to most any point in the United States, free of Freight charges.

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IN A FLOURISHING TOWN ON THE PACIFIC COAST. A rare opportunity for the purchase of a very desirable property.

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PRICES OF FOREIGN AND DOMESTIC GAS COALS.

[Reported Expressly for this Journal.]

July 18, 1874.

DELIVERED IN NEW YORK.

English Cannel.			
Ince Hall	$17 00	@	18 00
Kirkless Hall	16 50	@	17 00
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Newcastle Gas	$12 00	@	00 00
Liverpool caking	11 50	@	12 00
British Province Coals.			
International—At Sydney, $2 50 in gold			— —
Block House—At Mines, $2 12, Gold			0 00
Caledonia—At Mines, $2 00, Gold			0 00
Little Glace Bay—At Mines, 2 00, Gold			— —
Lingan—At Mines, $2 30, Gold			0 00
Reserve (Sydney) $2 25, Gold			0 00
(Duty, 15 cents per ton, gold. Freight to New York $2 50, currency. Cost of above coals delivered in New York, $5 50 @ $6 00, currency.)			
Pennsylvania Coals.			
Penn Gas Coal—At Amboy	$7 00	@	0 00
Westmoreland—At Amboy	7 00	@	0 00
(In New York both the above coals $7 50)			
Shafton	7 50	@	0 00
Youghiogheny	7 75	@	0 00
West Virginia Coals.			
MurphyRun	$7 40	@	0 00
Despard	7 40	@	0 00
West Fairmont	7 40	@	0 00
American Gas Coal	7 40	@	0 00
Fairmont	7 40	@	0 00
Newburgh Orrel	7 40	@	0 00
Pinnickinick	7 40	@	0 00
Cloverhill of Virginia	6 00	@	6 50
McKenzie Compound Mixture			— —
American Cannel Coals.			
Peytona of West Virginia	$12 50	@	00 00
Darlington of Pennsylvania			— —
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Trinidad Bitumen	— —	@	14 05

CHAPMAN VALVE COMPANY.

MANUFACTURERS OF

CHAPMAN GAS VALVES.

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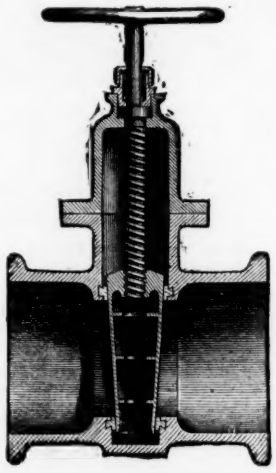
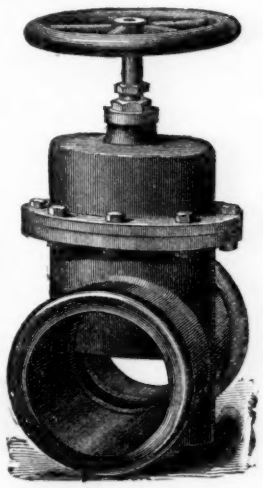


These Valves have been in use for several years, and are pronounced by all who have used them to be

The Best Gas Valves Ever Made.

They afford a direct passage the full size of the pipe. The seats are made of an alloy similar to BABBITT metal, specially prepared for the purpose, and superior to all other metals used for the seats of Gas Valves. It does not corrode under any circumstances to which it is exposed.

There is no LIABILITY OF COHESION between the Gate and Seat, and the Valves can be relied upon to SHUT TIGHE and OPEN EASILY at all times—an important desideratum when used for street mains, in cases of fire.



We refer to the following named Gas-Light Companies among the many that have used these Valves:

BOSTON GAS-LIGHT COMPANY, BOSTON, MASS.
CAMBRIDGE GAS-LIGHT COMPANY, CAMBRIDGE, MASS.
NEWTON & WATERTOWN GAS-LIGHT CO., WATERTOWN, MASS.
LAWRENCE GAS-LIGHT COMPANY, LAWRENCE, MASS.
PEOPLES GAS-LIGHT COMPANY, BROOKLYN, N. Y.
CITIZENS GAS-LIGHT COMPANY, BROOKLYN, N. Y.
SOUTH BOSTON GAS-LIGHT COMPANY, BOSTON, MASS.
CHARLESTOWN GAS-LIGHT CO., CHARLESTOWN, MASS.
LYNN GAS-LIGHT COMPANY, LYNN, MASS.
FITCHBURG GAS-LIGHT COMPANY, FITCHBURG, MASS.
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GAS AND WATER VALVES ½ INCH TO 36 INCHES DIAMETER.
STEAM VALVES ½ INCH TO 12 INCHES DIAMETER.

357-tf

CANNELTON COAL COMPANY

Of West Virginia,

Offer to Manufacturers of Gas the pure Cannel Coal from their Colliery at Cannelton, West Virginia. This coal after having been thoroughly tried by the most expert and reliable Engineers, has shown itself to be the most valuable **Enriching agent** produced in this country—a gross ton yielding **10,000** cubic feet of gas, of **64.54** candle power, to purify which, required only two bushels of lime. The yield of coke is **32 bushels** of good quality, quite light, burns freely, making a very hot fire. For further information address

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P. O. Box 1747. No. 325 Chestnut Street, Phil'a.

PEYTONA CANNEL COAL

From West Virginia.

Yields over **13,000** feet of Gas per ton. At ten thousand feet (standard yield) the illuminating power is over **43** candles. Purifies **4,510** feet to the bushel of lime.

S. E. LOW, Secretary,
354 Office, 58 Broadway.

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Entrance Examinations June 1 and 2, and Sept 23 and 24. For new Catalogue and late Entrance Examination Papers apply to PROF. SAMUEL KNEELAND,
255-12t Secretary, Boston, Mass.

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Steam & Gas Pipe Co.,

PROVIDENCE, R. I.,

BUILDERS OF

Coal and Rosin Gas Works,

FOR TOWNS AND MANUFACTORIES.

Estimates furnished of the cost of Works, and cost to Manufacture Gas in any Locality.

Gasholders,
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Water Tanks,
Purifier Covers,
Coke Barrows,
Cast Iron Socket Pipe.

Particular attention given to Enlarging and Re-building Gas Works.

For Lighting Manufactories, our Rosin Gas Works have been successfully used for *many years* past. They require but a small outlay, and afford a *safe* and *economical* light.

FOR SALE AT MANUFACTURERS PRICES:

EXHAUSTERS AND COMPENSATORS,
IRON AND CLAY RETORTS,
FIRE BRICK, CLAY AND TILE,
ROMAN CEMENT AND ROSIN,
STATION AND CONSUMERS' METERS.

REFER TO

Manufacturers' Gas Co., Fall River, Mass.; Youngstown Ohio, Gas Co.; New Rochelle, N. Y., Gas Co.; Homer and Cortland, N. Y. Gas Co.; Danbury, Conn., Gas Co.; North Bridgewater, Mass., Gas Co.; Cold Spring, N. Y., Gas Co., Rockville, Conn., Gas Co. Taunton, Mass., Gas Co.; Pawtucket, R. I., Gas Co.

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AMERICAN

GAS WORKS CONSTRUCTION AND *Supply Company.*

President—JAMES A. TAYLOR, Columbian Iro Works.

Engineer—A. F. HAVENS, late of Brooklyn Ca Light Co, Patentee of the following inventions:

HOISTING ENGINES,
COAL ELEVATORS,
WIRE-ROPE RAILROAD,
TRAYS FOR LIME OR IRON
RETORT CHARGING AND RAKING MACHINE,
RETORT SETTINGS,
SELF-SEALING LIDS,
AUTOMATIC DIP-PIPE SEAL
SECTIONAL PURIFIERS.

The above Patents are the result of many years experience and are of great value, enabling any Company to increase the capacity of its Retort and Purifying Apparatus 15 to 25 per cent without change, and at slight cost.

Plans, Specifications, and Details furnished of all Apparatus, and Companies supplied with every thing required in Gas Manufacture, from the greatest to the least, at the lowest market rates.

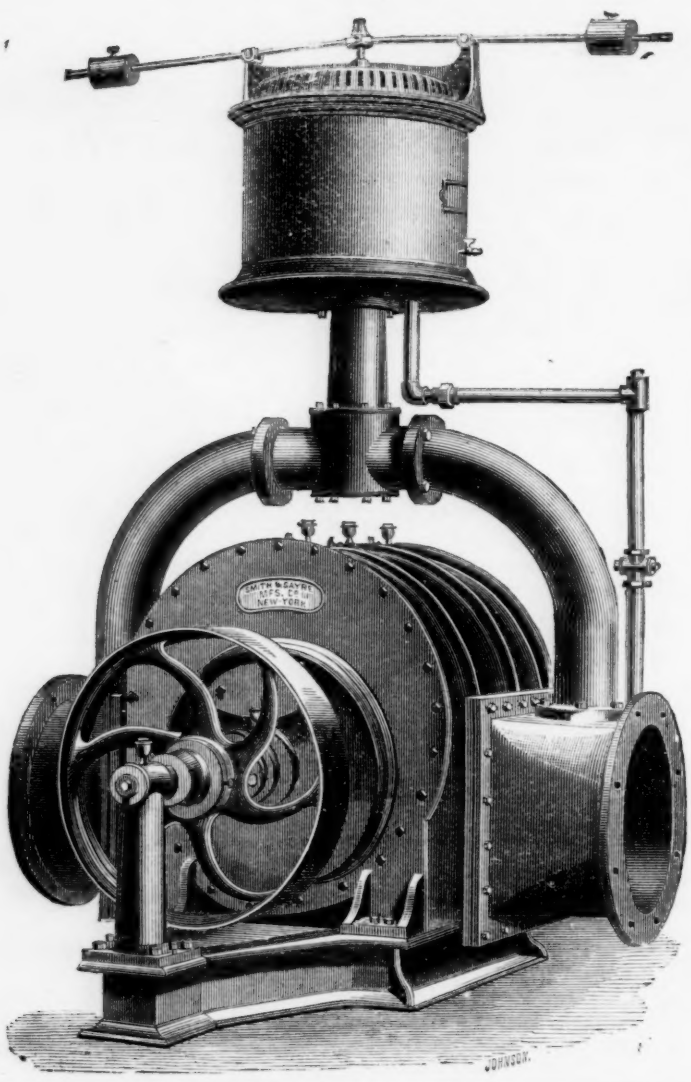
American Gas Works Construction and Supply Company,
No. 34 Dey St., N. Y.

☞ Mr. HAVENS can be consulted on all matters appertaining to Gas and its manufacture, gratis.

SMITH & SAYRE MANUFACTURING COMPANY.

The Mackenzie Patent Gas Exhauster

And Patent Compensator.



They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

MACKENZIE PATENT BLOWER. PATENT CUPOLA AND SMELTING FURNACE.

The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan. The Cupolas are manufactured in sizes to melt from 1 to 20 tons per hour, will save one quarter of the time required by the old style Cupola, and 33 per cent fuel. Address

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JAMES M. SAYRE, Treasurer. OFFICE, 98 LIBERTY STREET, New York.
CHARLES W. ISBELL, Secretary.

AMERICAN

GAS SCREEN MAN'F'G COMPANY.

TO GAS-LIGHT COMPANIES.

Your attention is respectfully called to the GAS SCREEN now being manufactured by the American Gas Screen Manufacturing Company, under the patents granted to E. DUFFEE, and are pleased to submit the following points of their excellence and superiority over all other screens now in use.

The Screen is made with an oak frame, interlaced with split rattan, drawn through holes at regular intervals in the Frame and cross-pieces, the edges of the frame being grooved to prevent abrasion.

The advantages of the screen are:

1st. The large purifying surface, the construction of the Screen giving over three-fourths of the surface for the gas to penetrate the lime.

2d. On account of the free passage of the gas through the screen the pressure is reduced, thereby preventing the accumulating of carbon on the retorts.

3d. The saving of lime and labor, as the Screens are not liable to clog, and are easily cleaned.

4th. Their cheapness and simplicity of construction.

5th. Their DURABILITY—they can be used longer than any other now used.

Testimonials.

PROVIDENCE, RHODE ISLAND, March 21st, 1872

E. DUFFEE, Esq., Agent, etc.

Dear Sir: The Trays manufactured by you for our West Station were put in use in September last, and have *given perfect satisfaction.*

The frames are well put together, and I see no reason why they will not last for a long time. The *very large amount of* open space in these Trays gives the gas an easy passage, and brings it into contact with the lime much better than when the space is so contracted, as is the case in most of the other Trays in use.

The pressure thrown upon the retorts by contracted passages is very great, and were gauges used more frequently than they now are in many gas-works, this facat of having *open Trays* would become more apparent to mangers of gas works. The digerence in pressure at this station in passing the gas through your purifiers, is two-tenths (2-10) inches.

The amount of gas purified, per bushel of lime used to this date, is six thousand five hundred and fifty six (6,556) cubic feet.

Respectfully yours,
JAMES H. ARMINGTON, Supt.

BOSTON GAS-LIGHT CO., Dec. 1871.

Dear Sir: In answer to your inquiry how we like your Patent Tray for dry gas purifiers, I take pleasure in saying we have used them exclusive of all others, for the last three years, and think them far ahead of any yet offered. The surface being nearly three times that of any other Tray, and their lightness and durability perfectly satisfactory.

Yours respedtfully,
A. M. GILES.

EDWARD DUFFEE, Esq.

EAST BOSTON, JUNE 15, 1871.

Gentlemen: We have used your Screens some five years. They give perfect satisfaction.

I consider them *by far the best Screen* for Dry Lime Purifiers I have seen. Yours truly, A. M. NORTON, Supt.

CHELSEA, May 1, 1871.

Mr. E. DUFFEE.

We are using your Purifying Trays, and find them to be the *best of any* that I have used, and will *purify more gas with less pressure* than any tray that I know. I can fully recommend them, after four years trial, to any Gas Superintendent with perfect safety, as the *cheapest and best Tray made.*

Yours truly, JOHN ANDREW, Sup't.

DORCHESTER, March 3. 1870.

Mr. E. DUFFEE.

Dear Sir: We have had your Gas Trays in constant use for almost one year and six months and find them superior to any others we have ever used, both in point of economy and efficiency. Truly yours, W. B. BROOKS,
Agent Dorchester Gas-Light Co.

JAMAICA PLAINS, MASS., June 21, 1871.

EDWARD DUFFEE, ESQ.

Dear Sir; The Trays ordered by this company three years ago, are getting somewhat worn. I wish to say here that I consider your Trays to be superior to any yet invented, therefore please make us another set at the price named, to be like the sample shown in every way, and oblige Yours truly
JAMES F. ROGERS,
Sup't Jamaica Plains Gas-Light Co.

BROOKLINE, June 11, 1871.

E. DUFFEE, ESQ.

Dear Sir: You will please make a set of Gas Trays for this company as soon as convenient, at price named. In regard to the merits of the Tray, after having them in constant use for over two years, I will say that I consider them *superior to any Tray* manufactured in this country. Respectfully yours,
H. A. ALLYN,
Sup't Brookline Gas-Light Co.

BANGOR, August 2, 1870

EDWARD DUFFEE, ESQ.

Dear Sir: Yours of the 20th ult. is received. In regard to your Gas Trays, I take pleasure in saying that they have been in use over two years, and have given perfect satisfaction and they are in good order at the present time; should have no hesitation in recommending them, believing they are the most durable and easiest kept in order of any with which I am acquainted. Respectfully yours,
W. H. PERRY, Sup't.

OFFICE OF THE SPRINGFIELD GAS-LIGHT CO.
SPRINGFIELD, MASS., Oct. 10, 1871.

MR. WARD,
President Hartford Gas-Light Co.

Dear Sir: I have been using Gas Screens made by the American Gas Screen Company, for nearly a year, and find them superior in every way to the wooden Screens made and formerly used by the Springfield Gas-Light Co. I can purify more gas with the same quantity of lime, there being more surface to the Screens; and I consider them more durable, and recommend them to your consideration.
Yours with great respect,
GEORGE DWIGHT

ROXBURY, June 14, 1872.

EDW. DUFFEE, ESQ.

Dear Sir: In answer to your inquiry regarding your Patent Gas Screens, I am happy to be able to say, that after nearly three years constant use we are perfectly satisfied with them in being able to purify over fifty per cent. more gas with them than with any other Screen we have used.
Yours respectfully,
THOMAS J. FISHOU

OFFICE DETROIT GAS-LIGHT CO.,
DETROIT, MICH., April 22, 1872.

AMERICAN GAS SCREEN MANUFACTURING CO., HAVERHILL.

Gentlemen: The Screens bought of you work far better than any we have ever used. As a proof, we have with the same quantity of lime purified *twenty per cent.* more gas with your Screens than with any others, and the work well done. The workmen are also better pleased with them—they being light and handy to work. They also relieve the pressure very much upon the retorts, and I cheerfully give yau my experience.
Yours truly,
P. E. DEMILL, Secretary.

We give a list of some Gas-Light Companies using them.

Providence, R. I. Gas-Light Co.. Boston, Mass. Gas-Light Co.: East Boston, Mass., Gas-Light Co.; South Boston, Mass. Gas-Light Co.; Springfield, Mass., Gas-Light Co.; New Bedford, Mass., Gas-Light Co.; Manchester, N. H., Gas-Light Co.; Reading, Penn., Gas-Light Co.; Biddeford, Me., Gas-Light Co.; Hartford, Conn., Gas-Light Co.; New Haven, Conn., Gas-Light Co.; New Orleans, La., Gas-Light Co.; Savannah, Ga., Gas-Light Co.; Charleston, S. C., Gas- Light Co.; Trenton, N. J., Gas-Light Co.; Charlestown, Mass., Gas-Light Co.; Dorchester, Mass., Gas-Light Co.; Chelsea, Mass., Gas-Light Co.; Baltimore, Md., Gas-Light Co.; Manhattan, N. Y., Gas-Light Co.; Cincinnati, Ohio.; Gas-Light Co.: San Francisco, Cal., Gas-Light Co.: Albany, N. Y., Gas-Light Co.; Sacramento, Cal.; St. Joseph, Mo., Gas-Light Co.; Leavenworth, Kansas, Gas-Light Co.; Macon, Ga., Gas-Light Co.; Roxbury, Mass., Gas-Light Co.; Lansinghburg, N. Y., Gas-Light Co.; Bridgeport, Conn., Gas-Light Co.; Stamford, Conn., Gas-Light Co.; Poughkeepsie, N. Y., Gas-Light Co; Scranton, Penn., Gas-Light Co.; Lewiston, Me., Gas-Light Co., and one hundred others.

Address **R. A. POTTER, Treas.,**
Amer. Gas Screen Man'f'g Co., Haverhill, Mass.
EDWARD DUFFEE, Agent.

J. L. CHEESMAN.

MANUFACTURER OF

Patent Conically and Diamond Slotted

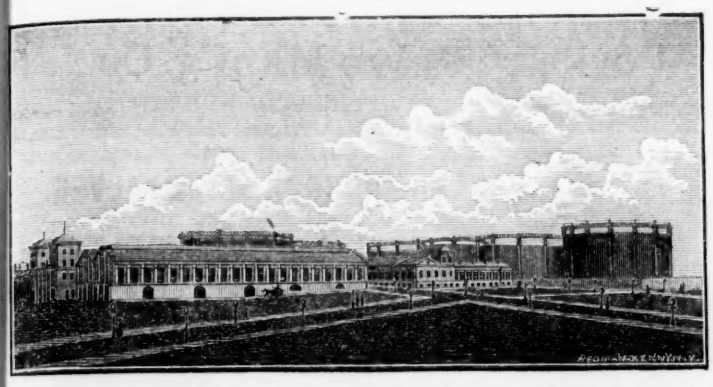
SOLID WOOD TRAYS.

PATENTED OCTOBER 21, 1862 AND JUNE 10, 1873.

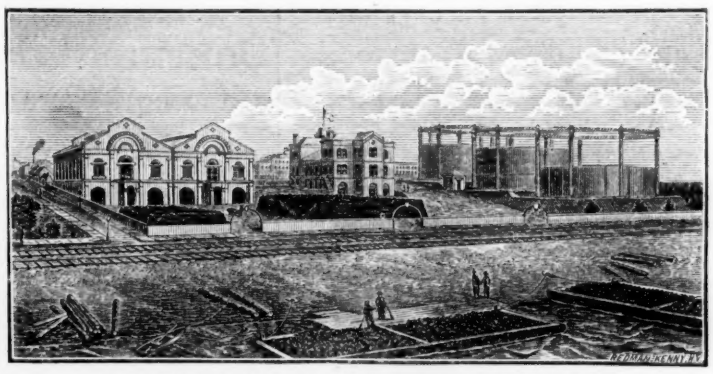
To Gas Companies.

The above Trays will last longer. and are cheaper than any Tray now used. They are now made without any outside strips, which gives more purifying surface, being perfectly smooth. The lime will not adhere to them as in other Trays. They are now used in over three hundred Gas Companies in the United States, and other places.

JOHN L. CHEESMAN,
151 and 153 Avenue C, New York.



CINCINNATI GAS-WORKS. ERECTED 1871-72-73.—WM. FARMER, ENG.



LACLEDE GAS WORKS, ERECTED 1872.—WM. FARMER, ENG

WILLIAM FARMER,

ARCHITECT AND GENERAL GAS ENGINEER,

111 BROADWAY, TRINITY BUILDING, Room 95, New York.

WILLIAM FARMER may be consulted upon all matters connected with the construction of GAS WORKS, or any other description of buildings Will furnish General and Detail Drawings, Specifications and Estimates for Gas Works of any capacity.

PATENTEE OF THE FOLLOWING INVENTIONS:

Exhausters for Gas and Foul Lime Ventilation,
Dumping Barrows for Coal, Coke and Lime,
Hydraulic Mains for Retort Benches,
Blowers for Forges, Foundries, &c.
Pumps for Water, &c., &c.

REFERENCES:

Professor SILLIMAN, New Haven, Conn.
GEN. CHAS. ROOME, President Manhattan Gas-Light Company, N. Y.
A. W. BENSON, President Brooklyn Gas-Light Company, Brooklyn, N. Y.
W. W. SCARBOROUGH, President Cincinnati Gas-Light Company, Cincinnati, Ohio.
S. L. HUSTED, President Laclede Gas-Light Company, St. Louis, Mo.
Prof. HENRY WURTZ, Editor AMERICAN GAS-LIGHT JOURNAL, N. Y.
GEN. A. HICKENLOOPER, Vice-President Cincinnati Gas-Light Co., Cincinnati, Ohio
FREDERICK CROMWELL, Vice-President Laclede Gas-Light Company. St. Louis, Mo.
C. VANDERVOORT SMITH, Engineer Manhattan Gas-Light Company, N. Y.
JAMES R. SMEDBERG, Consulting Engineer, San Francisco Gas-Light Co., Cal. [342

GAS PURIFICATION.

St. John and Cartwright's
NEW IRON COMPOSITION

Has purified, per bushel, on a single test, 10,000 feet of Westmoreland Gas. With revivification lasts indefinitely. Surpasses in POWER and ECONOMY all known materials. Saves largely in FIRST COST, SPACE, LABOR, SUPERINTENDENCE, and all current expenses. Will purify *easily* sulphurous gas, wholly *unmanageable by lime.* Takes out *all the ammonia.* Now operating in the following Gas Works: Harlem, New York (21st street); Port Morris; Hunter's Point; East New York Worcester, Lynn and Cambridge, Mass.; Lewiston, Maine; St, Albans, Vt.; Pawtucket, R. I.; Meriden, Ct.; and being introduced in many other places.

Cost 70 cents per bushel. One bushel for each square foot of Purifier sufficient. Rights to use for life of Patents, for daily makes of gas in thousands; under 25,000 $200; under 50,000, $400; under 100,000, $500; $250 additional for each additional 50,000 per day.

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ST. JOHN & CARTWRIGHT,
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☞ Immediate arrangements are urged, as the demand for the prepared composition is increasing *so rapidly* that delays in supply may occur.

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From the Sterling Colliery.

We are now prepared to place in the market, through our agents as below, a regular and unlimited supply of this valuable Cannel, for gas purposes. The analysis made in 1871 by Prof. WURTZ, Editor of this Journal, at the Laboratories of the NEW YORK GAS-LIGHT COMPANY, gave 47½ per cent of Volatile Matter and 45 bushels to the ton of a fair quality of coke. The yield of gas was at the rate of 9,500 feet per ton of about 27 candle power. It is not highly sulphurous, can be purified by Lime, and the ash from the coke does not clinker. The above test has been fully substantiated as correct, and can confidently recommend trial of the coal.

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All the Smith and Sheet Iron work required in and abou Gas Works. 226-tf

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Letters in reference to Coal should be addressed to the General Office of FREEMAN BUTTS, Cleveland, Ohio. 354

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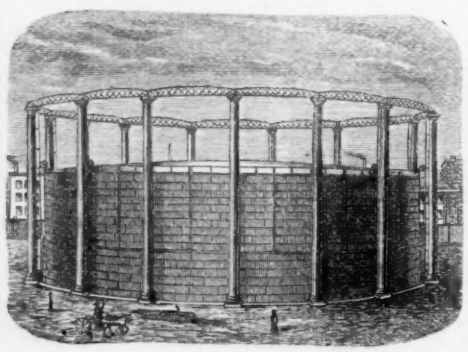

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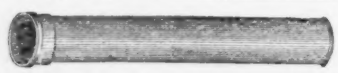

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It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York; the Brooklyn and Citizen's Gas Light Companies of Brooklyn, N. Y.; the Baltimore Gas Light Company of Baltimore, Md., and the Providence Gas Light Company, Providence, R. I.

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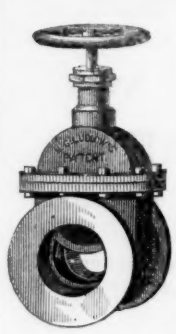

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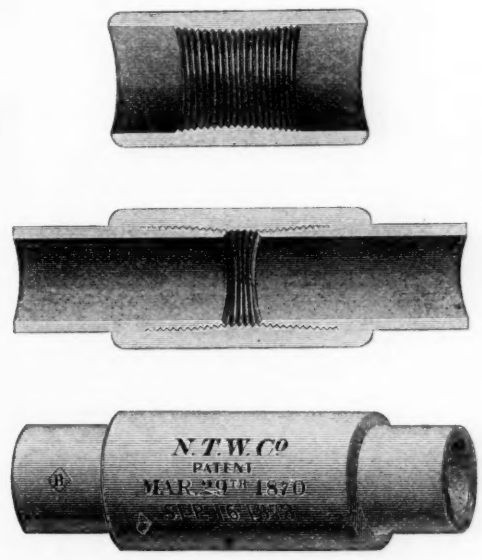

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The **Gas Coal** (Red Bank Orrel) is specially adapted to **Gas Manufacture,** its yield being as large as that of any Caking Coal in the market, of easy purification and good illuminating power.

The Cannel is superior to any of the Ohio Cannels, obtainable and can be delivered in any required quantity, from one car and upwards. For particulars as to price, etc., apply to

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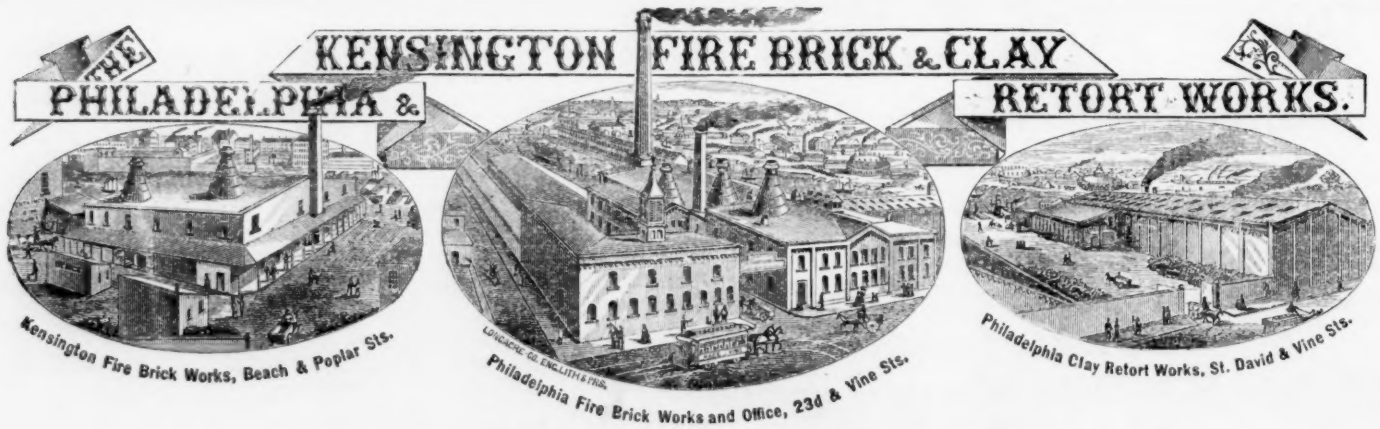
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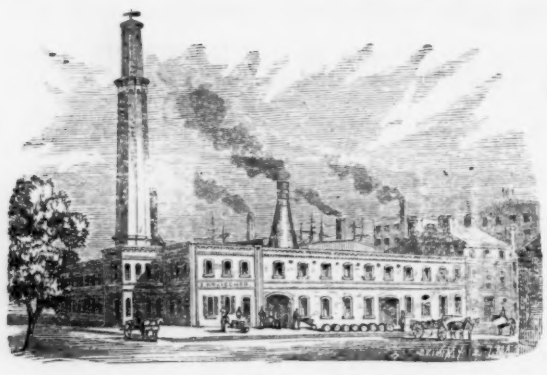

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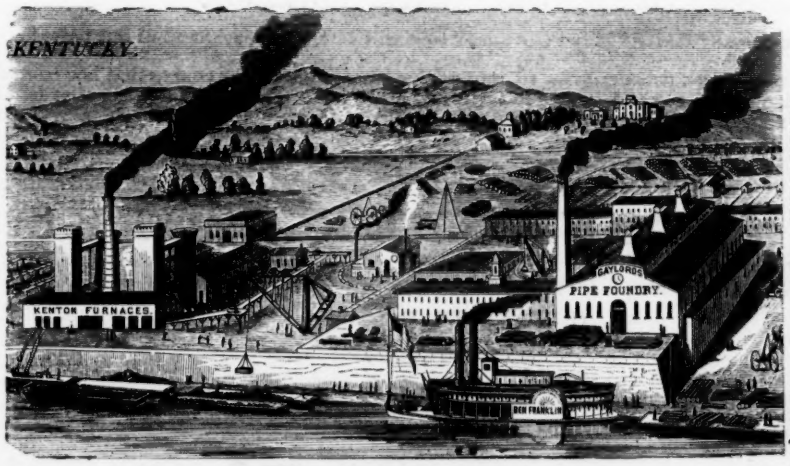

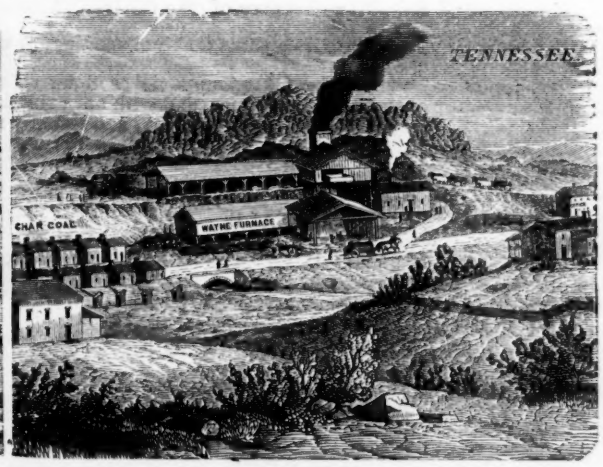

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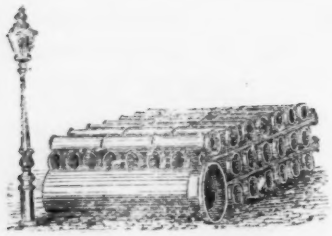

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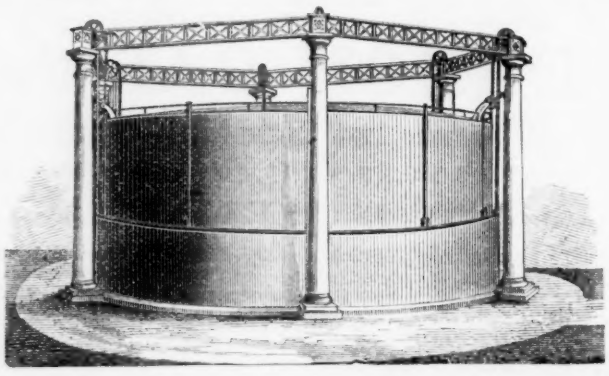

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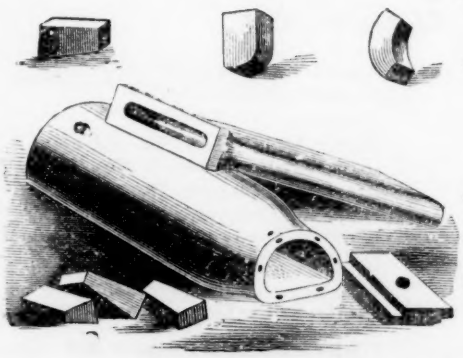

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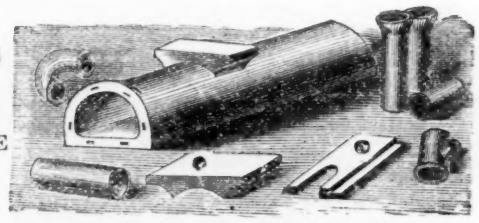

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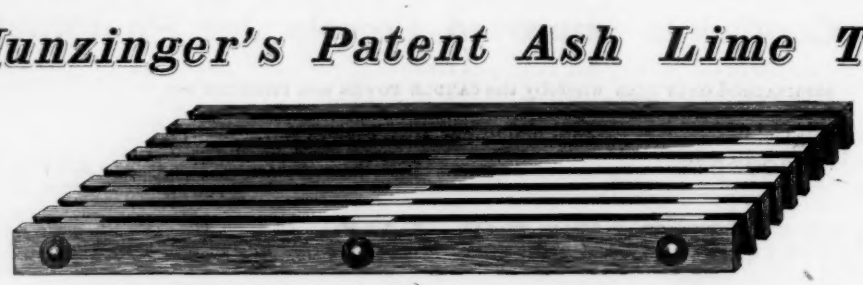

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